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INDUSTRIAL-ARTS MAGAZINE

Vol. VIII FEBRUARY, 1919 No. 2

An Experimentation in Vocational Guidance and Placement

A Bureau Supported by the North Bennet Street Industrial School

George C. Greener, Director

Need of Vocational Guidance.

IN a community like Boston, thousands of boys and girls, still too young in the eyes of the law to control their own wages, are instantaneously transformed into individuals responsible for their own support. Their only method of finding employment is "to follow the crowd," thus arriving at some unskilled job or other in the lowest reaches of our complex industrial system. They drift from one position to another, subjected during the plastic years of adolescence, to the demoralizing influences of unemployment and the stultifying effects of repetitive work. The result is economic waste and moral retrogression.

The young energies of the bulk of our population are claimed by crude occupations which demand little skill and preclude much development. Before these young lives have learned the meaning of good work, they have acquired the habit of unskilled labor; before they have felt the rewards of a sense of craftsmanship, they are marked by the aimlessness of "blind-alley" employment. In them, the principle of economic growth is violated. Individually, they can never attain their full stature as productive units of society, and consequently, the productive capacity of the entire nation is shortened by these early inroads upon the man-power and woman-power of the country.

The economic waste is attended by a moral loss of grave proportions. Both materially and ideally, the community suffers from its repudiation of responsibility for the young wage-earner's fate. A statement recently made by Mr. Sidney Webb, concerning the youthful workers of England, is equally applicable to this country. "The nation requires," he says, "and has the right to expect that up to twenty-one at least, every individual will grow not only in stature but also in wisdom, in character, and in civilization. If, as appears to be the case, in town and country alike, there is, between the boy when he leaves school at 13 or 14 and the youth of 18 or 19, in an enormous proportion of cases, a positive retrogression, our social machinery so far fails."[1]

In the case of young working girls our social machinery fails perhaps even more culpably. When careful investigators in this country tell us that "over fifty per cent of the young women interviewed in several recent studies carried on by settlement and other social workers, admit having been solicited while looking for work,"[2] we realize the extent of the moral risk involved in the mere search for a job, and the grossness of public negligence in this regard. Such conditions impose an unnatural strain on the self-protective powers of young girls who, in more fortunate circumstances, would still be under the tutelage of a secondary school.

The foregoing facts might easily be reinforced by others of similar import from various authors and social workers. In theory, it is generally admitted that social machinery is urgently needed to extend the protection of the public school over the initial years of vocational life. The movement for vocational guidance and for continuation schools has come about in response to this recognized need. But practical developments in both fields thruout the country have lagged behind the general expectation because of the lack of public support. In the meantime, the advent of war and the further increase of juvenile employment have established vocational guardianship as a public duty of the first importance. Existing experiments, tho tentative in character, may render a practical service by sharing the results of their experience with similar undertakings, already in action or preparing for it. It is in this spirit that the present sketch of the Vocational Guidance and Placement Bureau of the North Bennet Street Industrial School in Boston has been written.

Vocational Specialists Needed.

It is not unusual, as social investigators have testified, for adult workers to have lost nearly all trace of their years of academic schooling. We find laboring people who, in spite of seven years' work on the part of the public school, have reverted to a condition of practical illiteracy. While this is due partly to the fact that the subject matter of the traditional curriculum has so little application to the after-life of the industrial worker, it is mostly due to the conditions of industrial employment which nullify, instead of conserving, the results of school training.

Such cultural deterioration of the worker measures a definite public loss. The elementary schools are maintained at a great and growing cost. That they should abandon all responsibility toward the children who go to work in their teens is not only uneducational, but also unbusiness-like. No sound business enter-

1 Contemporary Review, Nov., 1916, p. 584.

2 Young Working Girls: A Summary of Evidence from Two Thousand Social Workers. Woods and Kennedy: Boston, 1913. P. 17.

prise would invest seven or eight years in the creation of a product and then trust to chance for its distribution and to accident for its placement. Yet this has been the standardized method of dealing with the invaluable product of the schools. It has been abandoned to the uses of private commercial enterprises, by which boys and girls are regarded more as cheap labor than as future citizens on whom the ultimate welfare of the republic depends.

As might be expected, the teachers have been among the first to realize the wrong done to the individual child and the waste of product tolerated by the public school. In many places, organizations of teachers have been formed for the purposes of vocational guidance. There are obvious reasons, however, why this new form of social protection for wage-earning youth should not be undertaken primarily by the schools or by the teachers. To be effective, the emphasis must be placed on the vocational life rather than on the school life. From the point of view of the school, it requires an outward-facing attitude which the best teachers cannot be expected to maintain. The work is exacting and requires more time than teachers or school can afford to give. It needs to be supplemented by social work, a service considerably differentiated from the profession of teaching. As to placement work, the public school cannot assume much responsibility since it cannot guarantee jobs, and parents of school-leaving children, especially in an immigrant community, might fail to understand this. For all these reasons, it seems more practical that the vocational guidance and placement work should be done by a separate agency, or, at least, by a department separate from the child's own school. While the closest co-operation is necessary, a new factor is genuinely needed.

The inability of parents to be the vocational counsellors of their own children increases the need of public care. The swift changes which are taking place in the industrial world outrun the procession of the generations. Few fathers and mothers can give their sons and daughters any accurate fore-knowledge of conditions and wages in juvenile occupations of today. Immigrant parents are doubly handicapped as guides for their children. The older generation is at work, and has no time to "look about." The co-operation of parents, like the co-operation of the school, is indispensable for effective vocational guidance but parents themselves are in need of information and advice such as only a trained vocational counsellor can give.

Boys and Girls in Industry.

The seriousness of the problem of boy and girl labor in the city of Boston is shown, first of all, by the great numbers employed. The federal census of 1909 gave 45,247 as the number of wage-earners between the ages of 10 and 20, inclusive. This great mobilization of workers under twenty is a considerable community in itself. The welfare of so many cannot be ignored or taken for granted in the social and municipal scheme.

A most enlightening instance of the need of vocational guidance for youths and young men occurred soon after the outbreak of war in 1914. So many were thrown out of work and unable to find new places, that relief shops and free employment bureaus were established to meet the emergency. At one of the bureaus, 150 men applied for work within two months. Practically all were unskilled workmen, but the most significant fact was that over one-half of the applicants were between the ages of 17 and 22. Upon inquiry as to what kind of work they desired, four-fifths of these youths answered general work. Training in any special line was wholly lacking. They knew of no skilled trade which they might enter. Lack of vocational advice; the academic character of their school course; home conditions, demanding a larger wage than that paid to the skilled trade apprentice; and the misguided advice of fellow-workmen;—these influences had combined to arrest completely their vocational progress. They had "stuck" in the backward class of general workers, namely: furniture movers' helpers, factory lumpers, hangers-on at the steamship wharves, errand and delivery boys. And yet in many cases they were capable of doing better work. One young man who came for help had heard of a job in a hospital looking after the laundry work. He did not know how to apply for the place himself as it was not general work. Armed with instructions from the employment bureau and with a letter from his former employers, he was at once hired. At 24, unskilled in any trade, unaware of any but general work, and unable to make intelligent application for a job, this young man typifies the vocational backwardness of a host of his contemporaries. Surely, vocational guidance is needed.

It may not be superfluous for this report to point out, rather than to assume, that girls need vocational guidance to the same extent as boys under modern conditions and that provisions for such work would be incomplete without a girls' department. Of the total 45,247 wage-earners under 20, referred to above, 24,902 were boys and 20,345 were girls. Thus, the girls constituted 45 per cent of the whole group under 20. It was safe to assume that the proportion is nearer one-half at the present time than in 1909, since the number of women of all ages at work has steadily increased during the last three decades. Girls, therefore, form nearly one-half of the city's young wage-earners and require the same amount of social care in the form of vocational guardianship that their brothers require. Their physical and mental development during early years of employment is of fundamental importance to the community in which they are to play so large a part both as industrial workers and as the mothers of the next generation.

There is a tendency to justify an attitude of indifference toward the conditions of employment

for young women on the ground that their presence in industry terminates with marriage and that deleterious influences connected with wage-earning are but temporary. To this we cannot do better than reply with the statement, made by Miss B. L. Hutchins in a recent study, that the question of the relation of the employment of the young girl to her health after marriage is a subject which has received too little scientific attention. "Only a minority of women," she writes, "are employed at any one time, but a large majority of young girls are employed, and it follows that the majority of older women *must have been employed* in those criticial years of girlhood and young womanhood, which have so great an influence on the constitution and character for the future."[3] From this point of view, the girls who leave industry to become wives and mothers cannot be safely consigned to the "Black Hole" of unskilled labor for any youthful period, however short in duration.

The remaining group, those who continue in gainful employment for the greater part of their lives, is a group for whose size we have, as yet, no accurate figures. But we do know from the census statistics of 1909, that a considerable number of women continue to earn with more or less regularity from 15 to 45 and over. Of the wage-earners in Boston under twenty, 45 per cent were girls; of those between 21 and 44, 30 per cent were women; and of those 45 and over, 22 per cent were women. These percentages indicate that the working lives of a larger number of women than we are accumstomed to allow for are fairly continuous, and that the consequences of the failure to acquire skill and training in youthful years pursue many low-grade women workers thru a long lifetime of poverty and want.

A further reason for the need of effective vocational guidance for girls is found in certain facts concerning unemployment recently set forth by a group of English investigators. Owing to the tendency of various trades to employ men or women predominantly, unemployment, which affects trades differently, comes to affect men and women differently. For instance, during the months following the outbreak of war in England, the percentage of unemployment among women workers was three times as great as that among men workers.[4] Vocational counsellors, therefore, need to be cautious about deducting the condition of the labor market for girls from that of the labor market for boys, and vice versa. The general lack of statistics concerning unemployment among female wage-earners renders especially necessary intelligent and adequate vocational guidance for girls and women.

Beginnings of Experiment.

Each city, town and community offers a special problem in vocational guidance. Industries center in chosen sections and attract employees more or less interested in, or adapted to, their kind of work. In a community dominated by a single industry, the task of vocational guidance is to help young workers to train themselves for the local industry or, if they are unfitted, to help them find their places elsewhere. This is the problem, for instance, of the towns and smaller cities given over to the manufacture of shoes, cotton, woolens, jewelry, etc. The larger cities offer a more varied list of opportunities for workers of different qualifications and abilities, tho here also the activities of a one-line industry may furnish the bulk of local opportunity.

Boston, like New York and other seaport cities, receives a host of immigrants who further complicate the industrial situation. The crowding of different nationalities into various sections of Boston has already taken place. The west end is largely Jewish; the south end, formerly Irish, is now given over to a constantly changing group of nationalities,—Jewish, Italian, Polish, Russian, Armenian and Negro. The north end,—the section with which we are most interested,—was formerly occupied by Jews, but is now occupied largely by Italians, while the most recent arrivals are Poles.

Within the north end there is a dense, homogeneous population of Italians surrounding the North Bennet Street Industrial School. Inside of a radius of four city blocks dwell 35,000 people, for the greater part Italian speaking. In two of the largest districts there is an average attendance of 5,000 pupils in the schools; and from two of the largest grammar schools there is an average of 150 graduates each year. A small proportion of these graduates go to the high schools or vocational schools, or trade schools, but the majority of them go to work. It is impossible for them to cope, unassisted, with the isolation of their racial group. In the immediate locality, the candy factory, the box factory, and various unskilled jobs in other factories offer the inducement of a comparatively large initial pay.

The child who passes directly from the school into one of these local employments is entering upon a future whose horizon is limited to the north end of Boston, if not indeed to the particular factory into which he has drifted. Neither the child nor his parents have any idea of the range of opportunities open to him, for, limited as this range is for fourteen-year-old workers, it is still wider than the family alone can appreciate. Boys and girls of immature years are forced to make decisions which determine the course of their future years; from confused and bewildered children they become the dissatisfied and unsuccessful men and women whom we see struggling along in vocations for which they have no special aptitude or training. It is idle for us to urge boys and girls to search for and find success unless we take the trouble to point out the road to them.

This is the problem which the North Bennet Street Industrial School has set itself to solve. The

3 Women in Modern History; B. L. Hutchins, London, 1915, p. XVII.
4 The War, Women, and Unemployment. The Fabian Society, London, 1915.

function of this school is experimental work in education; it has initiated and developed many educational projects to the point where the kindergartens, manual training, prevocational classes, and industrial classes have been established and their value has been demonstrated. As each of these experiments was worked out and turned over to the public school or other agency, new experiments were undertaken to be worked out in the same way.

In June, 1915, a Vocational Guidance and Placement Bureau for the North end was added to the school's activities. Co-operating with the schools, the bureau went to work with two full-time counsellors, a man to advise the boys and a woman to advise the girls. The children dealt with were primarily those of school leaving age. Later the scope of the plan was broadened, and the vocational needs of the older boys and girls and of the members of the evening classes and clubs were included in the work.

Organization of Work.

The work of the bureau may be summarized as follows: To prevent when possible the immature school-leaving of boys and girls; to lay before them possible field of work and to aid and advise them in the choice of a vocation; to place the individual in work which will bring out his capabilities; and to advise after placement both as to continued school work and as to difficult problems arising in connection with his employment where mature counsel is needed. Just here we might pause to mention the proneness of boys and girls to accept the advice of young companions rather than that of their elders. In many cases, a boy has thrown up a job because another boy said there was no future in it, tho the counsellor, who personally knew that it held opportunities and felt assured of the boy's eventual success in it, exerted every persuasion to prevent the misstep. This attitude is characteristic of youth everywhere, and must be duly taken into account. It is no small part of the task of vocational guidance to win and keep the confidence of those who need it most.

At every step of the work, close co-operation with the school, the home, and industry is necessary.

Relations With the School.

In order to conserve the results obtained by the educational experiments of the North Bennet Street School, the vocational guidance and placement department has come to play an increasingly important role in the school's program. Vocational education and the intermediate school will fail of their purpose unless the children are advised as to their vocational future and are placed at work in the light of definite knowledge of each child's capacity and the nature of his employment.

Besides the work done with the boys and girls of the prevocational classes, the bureau co-operates with the two large public schools of the district, the Eliot School for Boys and the Hancock School for Girls. Each graduate is interviewed before the end of the school year and advised of the educational and industrial opportunities open to him. Emphasis is laid on the educational opportunities, for the bureau aims, first of all, to prolong the child's school life. He is advised how to do this by means of day, evening, or part-time courses. Every effort is made to keep back as many 14-year-old workers as possible from the overcrowded labor market and to secure for them another year of school training along vocational lines.[5] If the child must work, he is advised of the best opening in the particular line which he desires and for which he seems best adapted.

Children who do not remain to graduate but who leave school the day after their fourteenth birthday constitute a serious problem for the vocational counsellor, who, in order to reach all, must organize well. But the chaotic system of school leaving permitted by the law is a great handicap to thoro work. Children "break out" of school suddenly and are gone before help can reach them. If it were made the rule that they could leave only at stated intervals,—say, just preceding the Christmas vacation, the spring vacation, or the summer vacation,—the conditions surrounding their school leaving would be greatly improved in many respects, especially in respect to their vocational decisions.

A useful feature in the co-operation between the vocational guidance bureau and the public schools is found in the part which the bureau plays as a steady transmitter of criticism from employers to school heads. Every city is familiar with the situation by which the local Chamber of Commerce or other organization of employers attacks the proficiency of the schools and declares that the pupils are badly educated. The school authorities reply with a general denial, and the debate is continued with more or less heat until the subject dies down. Clearly, such sporadic outbursts of criticism and defense are not the ideal method of adjusting education to the demands of employment. Here it is possible for the Vocational Guidance and Placement Bureau to render a constructive service by being constantly on the alert as a regular and equalizing medium thru which the schools can ascertain whether their work is practical or not. The bureau should be in a position to report back to the school what per cent of the children sent out are unfitted for the local occupations. This would be a definite contribution to the school's efficiency.

Relations With the Home.

The importance of enlisting the co-operation of the home cannot be too strongly emphasized. The experience of the North Bennet Street Bureau has shown that about half of the cases would have been handled in vain if the home had not been followed up. In the placement work, the consent of the parents is essential. Before a child is finally placed in a position,

5 Girls who enter the Co-operative Power Machine Class are paid a small stipend weekly to enable them to postpone wage-earning. A report of this work has lately been published by the North Bennet Street School. A further extension of such maintenance-scholarships for both girls and boys is needed.

his parents come with him to the vocational counsellor and hear all about it.

Poverty is pressing hard on most of these parents, and they are seldom far-seeing on the child's behalf. Italian parents get all the child's wages, and a difference of fifty cents a week between a "blind alley" job and a job with opportunities may easily lead them to prefer the "blind alley" employment. With the daughter especially, Italian parents feel that wage-earning is but a brief prelude to marriage and that it doesn't matter much what she does so long as she earns as much as possible and spends as little as possible. Low grade work in the neighborhood is preferred to high grade work at a distance which requires car fares and lunches. There is also a strong sentiment that the girl's safety depends on parental surveillance and that she should therefore be employed as near home as possible.

One of the strongest traits of the Italians is the desire to hold together the family group. The effect of this intimate relation sometimes militates against the vocational advancement of sons as well as daughters. One young man of 24 was placed in a better position than he had ever had before and at better wages. The place was twenty miles from his home and it was planned that he should make one visit home weekly. He worked one day at his new job, became homesick as a result of a telephone call from his mother, and returned to Boston. Later the mother visited the counsellor and said that her devotion to her boy prevented her allowing him to work where he could not return home each night. Another young man, as old as the first, was also placed at work, twenty miles from home but with excellent possibilities. Only by the help of continued advice from the counsellor and from friends, and of numerous visits to Boston, was he able to remain in this position, for which he showed aptitude and fitness and in which he was several times rewarded with advancement and pay.

Instances like these illustrate the constant necessity of social work in the home as the feeder and ally of the industrial phase of vocational guidance. Our schools have at last learned, after a hundred years of experience, that it is impossible to disregard the home as a factor in the child's school progress. This fact should be kept in mind in all experiments towards vocational guidance. The ideas and ideals of the family circle,—varying with the nationality, the neighborhood, the individual family, and its relation to the poverty line,—must always be enlisted if the vocational counsellor is to be effective.

Relations With Industry.

One of the outstanding facts of modern industry is the swiftness with which great changes in method and environment are introduced. The vocational counsellor must maintain a vigilant survey of the local industries. This will be especially necessary for the period of the war and afterwards. For instance,

The small boy at the left stopped school for this "blind alley" job.

wartime conditions in the factories of England have vastly accelerated the improvements in machinery and the range of youth's occupations. The extended use of mechanical power means jobs for young wage-earners and for women.

Furthermore the existing difference between job and job is far greater than people in general imagine. Certainly it is far greater than boys and girls starting out in the world have any conception of. In a little volume published by the Cleveland Education Survey called "Boys and Girls in Commercial Work" we find the following discrimination: "A study of occupations for purposes of public training seeks to reduce them to points of identity or resemblance; a study of occupations for guidance seeks to differentiate them. Vocational training cannot provide a limitless number of special courses, nor could the potential wage-earner know on what basis to choose among them. From practical necessity, training asks of occupations, 'How are they alike?' Guidance is free to cast a sweeping glance over the whole range of them and ask 'How are they different?' "

As far as the majority of children are concerned, jobs are all alike; it is the business of the vocational counsellor to show them how they are different. The chief characteristics of a vocation to be discussed are remuneration, hours, healthfulness, safety, advancement, social standing, and personal suitability. To all of these, some attention should be given.

It is obvious, then, that no merely superficial acquaintance with local industries and employments will suffice for a vocational bureau. A thoro vocational survey must be made at the beginning and the survey must be kept up to date. To do this, the agent should be able to divide his time systematically between the schools and the local industrial and commercial establishments. If, as has already been sug-

gested, the school-leaving time were restricted to definite periods within the year, the organization of the placement work would be greatly facilitated. Personal inspection of establishments and processes and personal visits to manufacturers and other employers are an essential part of the agent's program.

In the investigation of industries, the vocational bureau should arrange to co-operate with other municipal or social agencies engaged in the inspection of factory and business establishments. This is advisable in order to prevent duplication of effort and loss of valuable time. The North Bennet Street Placement Bureau has full access to the records of the Boston Placement Bureau and the Vocation Bureau. The Vocation Bureau investigates cases but does no placing, while the Boston Placement Bureau places as well. The industries of the north end are investigated from year to year by these three bureaus in co-operation. A monthly report of the placement work done by each of the placement bureaus is sent to the secretary of the Boston School Committee, in order that the city may have complete reports of all placement work being done. Further co-operation is maintained by turning over cases to the office best fitted to handle them.

By the diligent employment of its resources and the resources of co-operating agencies of inspection, the Vocational Guidance and Placement Bureau should acquire a thoro and accurate knowledge of conditions in local industries. If this knowledge is wisely used, it can be made the instrument of betterment of industrial conditions. For examples, the Juvenile Employment Exchanges of England have proved their social usefulness in this way. They have been in a position to refuse to send boy and girl workers to establishments where growing youth was utilized without regard to its physical and mental need for development.

Follow-Up Work.

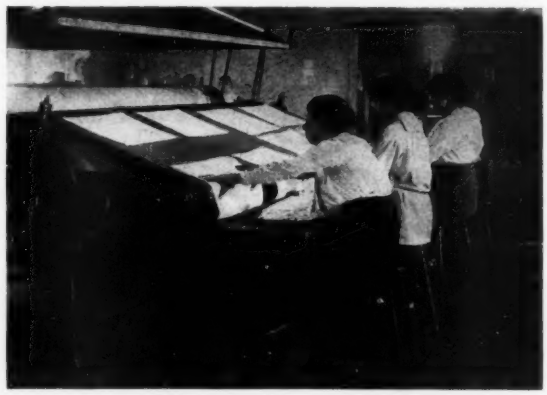
Having placed before the boy or girl the possibilities of work, the task of the counsellor becomes more difficult. To advise the choice of a particular occupation is a great responsibility. It seems better that the young worker should make his or her own choice under careful guidance. His grades and his studies in school will help the counsellor; his teacher may offer wise suggestions; his work in the prevocational class is invaluable; his home surroundings may give a directive idea; his inclinations, as shown in the games he plays, in his club activities, in his reading or class-work, may be consulted; his parents' desires and ambitions may be taken into consideration,—all these sources may be tapped in discovering the work that the boy should undertake. But there is a distinct value in allowing him to choose the line of work which he will follow after having given him the means of making a choice wisely. The counsellor, however, has the opportunity to place the young worker in an establishment where the conditions of work are wholesome and beneficial.

Once the choice of an occupation has been made and a position secured, comes the task which is of the utmost importance in the counsellor's work, namely, the follow-up work of the boys who have left school at 14. Some perhaps have chosen to be woodworkers, machinists, or printers. Several years must elapse before they are old enough to handle the tools and machinery which had interested them sufficiently to determine their choice of a trade. To continue at errand work in the meantime is distasteful and dissatisfaction sets in, obscuring the distant objective. In this mood, the youth is easily turned aside into an unskilled trade offering the larger initial pay. During this period of apprenticeship, the need for guidance is very great.

Furthermore, these boys will start in their chosen trade a few years hence with a great handicap, since their companions will have gone further in school and will have entered the trade much better equipped. They must be told of the opportunities for further study and its value must be impressed on them. It should be brought home to them that evening study must follow immediately upon leaving day school in order that the handicap imposed by early school leaving may be overcome. On the occupational side, the boys and girls should continue to receive helpful information in regard to working conditions. This may be given in the form of round-table talks on their work, labor laws, standard working conditions, when to ask for a raise, and special problems of the local occupations.

The bureau has learned the wisdom of following up the cases of workers who have placed themselves. It has found the employers very helpful and pleased to know that someone was interested in the young worker's career. It has also met with the most encouraging responses from the boys and girls who have been asked to come to evening conferences, and to join the evening classes of the North Bennet Street School.

(To be concluded in the March issue.)



A non-progressive occupation from which the Bureau seeks to save girls. Note how the first girl must reach.

A Method for Teaching Straight Matter Composition

Harry W. Osgood, Teacher of Printing, Jersey City, N. J.

PRACTICE makes perfect" and skill in typesetting, as in other lines of effort, is obtained only by unremitting practice. The efforts of the pupil must be properly directed and tested methods followed thruout the course.

The material shown here is designed to aid in teaching the composition of straight matter, and the method if properly carried out will reduce individual instruction to a minimum.

In the first exercise we start with the lower case "e" in teaching the lay of the type case. Other letters are added as each new line is assembled. The words are spaced with the 3-to-em space and all lines are so arranged that they justify automatically.

Exercise Copy No. 1.

**eeee

Amount of Space which the Line is Short by ¼ ems	NUMBER OF WORDS IN LINE							
	6 Words	7 Words	8 Words	9 Words	10 Words	11 Words	12 Words	13 Words
¼ em	4 & 5-em, 3 places Two 5-em, 2 places	Two 5-em, 4 places 4 & 5-em, 2 places	Two 5-em, 6 places 4 & 5-em, 1 places	Two 5-em, all places	Two 5-em, 8 places 3-em, 1 place	Two 5-em, 8 places 3-em, 2 places	Two 5-em, 8 places 3-em, 3 places	Two 5-em, 8 places 3-em, 4 places
½ em	En quad, 3 places 4 & 5-em, 2 places	4 & 5-em, 5 places En quad, 1 place	4 & 5-em, 6 places Two 5-em, 1 place	4 & 5-em, 4 places Two 5-em, 4 places	Two 5-em, 6 places 4 & 5-em, 3 places	Two 5-em, 8 places 4 & 5-em, 2 places	Two 5-em, all places	Two 5-em, 11 places 3-em, 1 place
1 em	3 & 5-em, all places	En quad, all places	En quad, 4 places 4 & 5-em, 3 places	4 & 5-em, 7 places En quad, 1 place	4 & 5-em, 8 places Two 5-em, 1 place	4 & 5-em, 7 places Two 5-em, 3 places	Two 5-em, 6 places 4 & 5-em, 5 places	Two 5-em, 8 places 4 & 5-em, 4 places
1¼ ems	3 & 4-em, all places	3 & 5-em, 5 places 3 & 4-em, 1 place	En quad, 5 places 3 & 5-em, 2 places	En quad, 6 places 4 & 5-em, 2 places	4 & 5-em, 5 places En quad, 4 places	4 & 5-em, 8 places En quad, 2 places	4 & 5-em, 10 places Two 5-em, 1 place	4 & 5-em, 9 places Two 5-em, 3 places
1½ ems	Two 3-em, 3 places 3 & 4-em, 2 places	3 & 4-em, all places	3 & 5-em, 5 places 3 & 4-em, 2 places	3 & 5-em, 5 places En quad, 3 places	En quad, all places	En quad, 7 places 4 & 5-em, 3 places	4 & 5-em, 7 places En quad, 4 places	4 & 5-em, 10 places En quad, 2 places
1¾ ems	Space limit for 6 Words	Two 3-em, 3 places 3 & 4-em, 3 places	3 & 4-em, all places	3 & 5-em, 5 places 3 & 4-em, 3 places	3 & 5-em, 7 places En quad, 2 places	En quad, 8 places 3 & 5-em, 2 places	En quad, 9 places 4 & 5-em, 2 places	En quad, 7 places 4 & 5-em, 5 places
2 ems		Two 3-em, all places	3 & 4-em, 4 places Two 3-em, 3 places	3 & 4-em, all places	3 & 5-em, 5 places 3 & 4-em, 4 places	3 & 5-em, all places	En quad, 6 places 3 & 5-em, 5 places	En quad, all places
2¼ ems		Space limit for 7 Words	Two 3-em, 6 places 3 & 4 em, 1 place	3 & 4-em, 5 places Two 3-em, 3 places	3 & 4-em, all places	3 & 4-em, 5 places 3 & 5-em, 5 places	3 & 5-em, 10 places 3 & 4-em, 1 place	3 & 5-em, 7 places En quad, 5 places
2½ ems			Space limit for 8 Words	Two 3-em, 6 places 3 & 4-em, 2 places	3 & 4-em, 6 places Two 3-em, 3 places	3 & 4 em, all places	3 & 4-em, 6 places 3 & 5-em, 5 places	3 & 5-em, 10 places 3 & 4-em, 2 places
2¾ ems				Space limit for 9 Words	Two 3-em, 6 places 3 & 4-em, 3 places	3 & 4-em, 7 places Two 3-em, 3 places	3 & 4-em, all places	3 & 4-em, 7 places 3 & 5-em, 5 places
3 ems					Space limit for 10 Words	Two 3-em, 6 places 3 & 4-em, 4 places	3 & 4-em, 8 places Two 3-em, 3 places	3 & 4-em, all places
3¼ ems						Space limit for 11 Words	Two 3-em, 6 places 3 & 4-em, 5 places	3 & 4-em, 9 places Two 3-em, 3 places
3½ ems							Two 3-em, 9 places 3 & 4-em, 2 places	Two 3-em, 6 places 3 & 4-em, 6 places

The 3-to-em spaces are inserted between the words as the line is composed. Ascertain how many 4-to-em spaces the line falls short of filling the measure; count the words in the line and refer to the proper column in the chart to determine the combination of spacing pieces which will *approximately* space out the line. After replacing the 3-to-em spaces with these, make all the changes necessary to properly *justify* the line, adjusting the spacing so that openings between the words will appear uniform.

The space combination indicated on the chart will space out the line so that it will never be short more than one-quarter of an em. This allows the insertion of larger or smaller spaces to obtain a more even distribution of white space between the words.

Thoro drilling in the principles of spacing should be given, in which the pupils are made to recognize the characters which require extra space, and the characters after which the space may be diminished.

Regular spaces, each size of which is a fractional part of an em, will be found more practicable for teaching the proper spacing of straight matter than the point-set spaces usually supplied by the type-founders. In ten point (the size generally used for instruction purposes) the "3-to-em" space is 3½ points thick in point-set fonts, but the typefounders will furnish the regular 3-to-em space if it is specified. There is no material difference in the other ten point spaces.

Have the 4-to-em spaces specially nicked to insure clean distribution. The typefounders will do this for a few cents per pound.

The standard arrangement of the type case should be taught. A few printers, to facilitate composition, have transposed the 4-to-em and the 5-to-em spaces, and the colon and semicolon, but changes in the lay of the type case are not looked on with favor by the average printer and innovations of this nature are slow to find general acceptance by the craft.

After the pupils have learned the type case and have become familiar with the spacing material, the composition of plain paragraphs may be taken up.

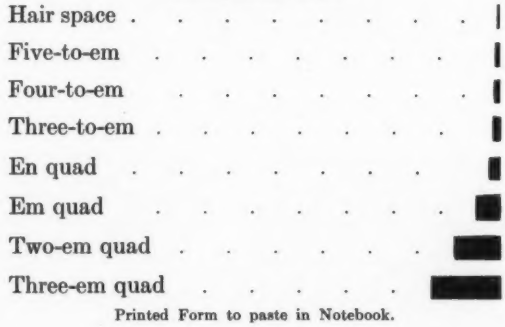
The spacing problems of every line should be considered as the exercises are set in type and the instructor should point out the places where the shape of letters affect the spacing.

Place an en-quad before sentences within a paragraph. If the line is widely spaced, the space may be increased, but not to exceed an em-quad. The old rule for spacing sentences within a paragraph with an em-quad is not followed on high grade composition; present-day standards call for closer spacing.

Give special attention to the spacing when the proofs are read. Train the pupils to recognize uneven distribution of white space and mark all spacing faults on the proofs.

When corrections are made care should be taken to preserve the justification and prevent the uniformity of the spacing from being impaired. The lines should always be corrected in the stick.

Quads and Spaces—The Spacing Material Used in Setting Body Type.



Printed Form to paste in Notebook.

THE real measure of printing is the quality of its typography. Printing which lives, and which achieves a name for its producer, depends upon the merits of its typography.

—*Henry Lewis Johnson.*

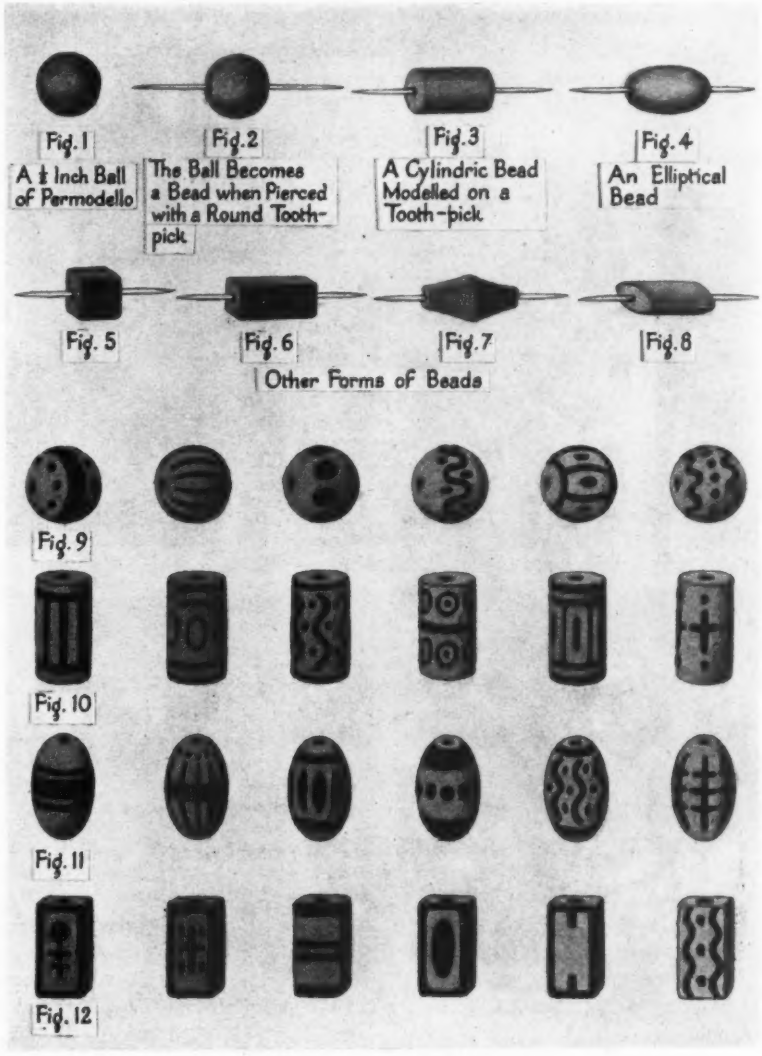
Projects for the School Bazaar: Permodello Modeling

Bonnie E. Snow and Hugo B. Froelich

(Article 5)

PERMODELLO is a trade name for clay which has been chemically treated so that it hardens when exposed to the air and becomes like porcelain, without being subjected to intense heat. It has all the plastic qualities of clay, is finer in grain and does not shrink or crack when dry. Therefore its surface can be decoratively painted, in the making of beads, pendants, hatpin heads, lavallieres, and other accessories of costume. Permodello should not be used in making vases, jars or other utensils whose prime requisite is that they should hold water. Probably there is no substitute for firing,—a process which presupposes the fusing of certain ingredients contained in clay, thus making it impervious to water.

Permodello is really a substitute for modeling wax, and is an invention of necessity. Someone desired a material which would possess the plastic qualities of wax, but which would harden without cracking and thus enable the designer of jewelry, for instance, to submit a model of his idea, not only in three dimensions, but in three dimensions in color, for color can be applied to Permodello as easily as to paper or to wood.



STEPS IN MAKING PERMODELLO BEADS.

Permodello beads and other decorative objects when painted resemble the work of Egyptian and Indian craftsmen, who modeled from clay, subjected their forms to intense heat, and afterward painted them, sometimes resorting to a second firing to fix and glaze the colors. The possibilities of Permodello

modeling are well nigh inexhaustible. As a medium for expressing ideas of design it is equal to clay, and because it is permanent and can be painted, it is superior to clay. The tin can in which Permodello is shipped should never be left open. If it is necessary for the worker to leave his task before the modeling is completed, a damp cloth should always be laid over the work to prevent the evaporation which results from undue exposure to the air.

Opaque water colors may be applied to Permodello while it is still moist. After the decoration is complete, both paint and Permodello must be allowed to dry thoroly, before the finishing coat of transparent varnish or white shellac is applied. This finish protects the painted color. Without it the various beads, pendants, hatpins, lavallieres, etc., would not stand the wear and tear of practical use.

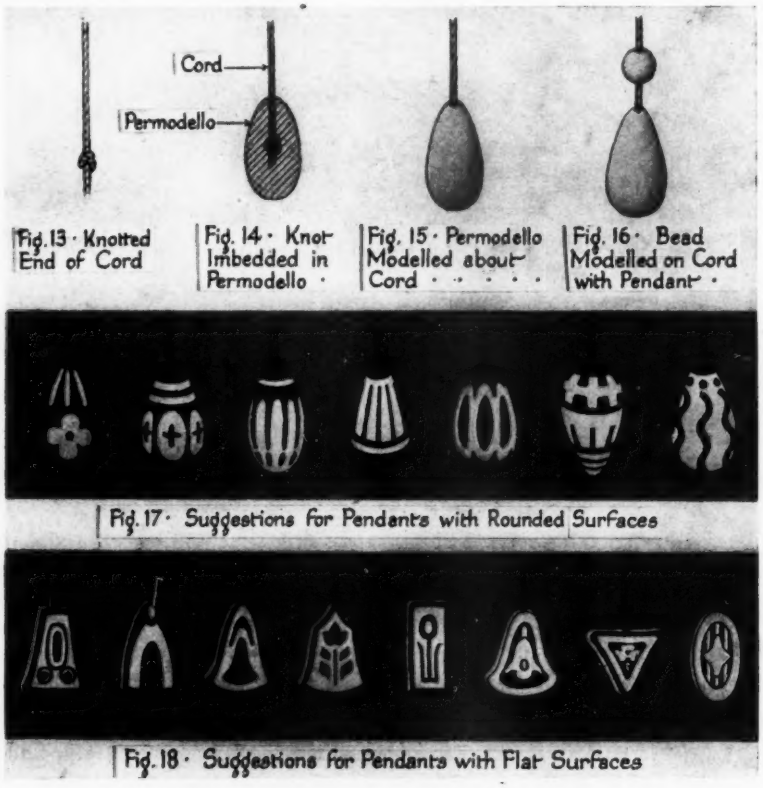
If for any reason oil or enamel paints are preferred to opaque water colors, they may be used with equally good results, provided the modeled Permodello is allowed to dry thoroly before the decoration is applied. Enamel paints are oil paints mixed with varnish. Designs painted with them always show a gloss or "shine," thus presenting nearly the same effect as designs that are painted first with show card colors and then varnished or shellaced. It is wise to put a finishing coat of varnish, however, upon beads or hatpins which have been painted with enamel, as such treatment prolongs the life and durability of the decoration.

Permodello Beads.

The making of beads is a simple problem and one that will interest all beginners in the art of modeling. The question of age has little to do with it. Children of 6 can model a ball of Permodello and pierce it with a wooden toothpick (Fig. 1), afterward painting it with a single bright color. High school students may prefer to model directly on the toothpick, modifying the shapes in great variety, as shown in Figs. 3 to 8. Each bead becomes a basis for interesting designs and color. Fig. 9 shows a number of suggestions for spherical beads. Strong contrasts of value are best. The use of black, white and one intense color has safeguarded many a class of students of all ages. With black and white the necessary effect of dark and light is secured, and the color sense is satisfied thru the use of one intense color. Variety is attained thru freedom to choose any one color and any arrangement of lines and dots that may be preferred.

The undercoat of color must be dry before another color spot is placed upon it. The finished bead when dried should receive a coat of varnish.

Fig. 10 shows a group of cylindric beads. They were modeled upon an "axis," such as a toothpick, a wire nail or a hatpin, and were left until partially dry. The axis was then moved freely about to prevent adhesion, but was left in the bead as a convenient


Cord
Permodello
Fig. 13 · Knotted End of Cord
Fig. 14 · Knot Imbedded in Permodello
Fig. 15 · Permodello Modelled about Cord
Fig. 16 · Bead Modelled on Cord with Pendant
Fig. 17 · Suggestions for Pendants with Rounded Surfaces
Fig. 18 · Suggestions for Pendants with Flat Surfaces

STEPS IN MAKING PENDANTS AND SUGGESTIONS FOR DECORATIONS.

handle to use when painting. The groups shown in Figs. 11 and 12 are modifications of the cylindric forms. The resemblance of these beads, painted as they are in bright colors, to Venetian, Egyptian and Indian beads, is quite apparent. Beads of this kind may be strung on strong cords, and spaced with small glass beads in a great variety of ways. Strings thus made are beautiful in color and design, and add a distinguished touch to an otherwise commonplace costume.

Permodello Pendants.

Pendants are bead-like forms used to finish the ends of cords. They are not pierced for stringing as beads are, but are either modeled directly on the cord, or a wire loop is imbedded in the top of the other geometric forms are employed, painted in strong contrasts of color values. Beads and pendants are intended for use as sparkling bits of decoration. They are worn as jewels; therefore intense color notes are entirely in keeping with the character of the ornament. Here again the safe rule of black, white and one intense color will insure brilliancy of effect.

Permodello Hatpin Heads.

From the making of beads and pendants to the modeling of hatpin heads is an easy step. Fig. 19 shows the basis of this interesting problem,—a penny hatpin with a black (or white) head. A lump of Permodello is pressed around the head, until it is entirely covered (Fig. 20). The form is then modeled to any shape desired (Fig. 21). Two designs are

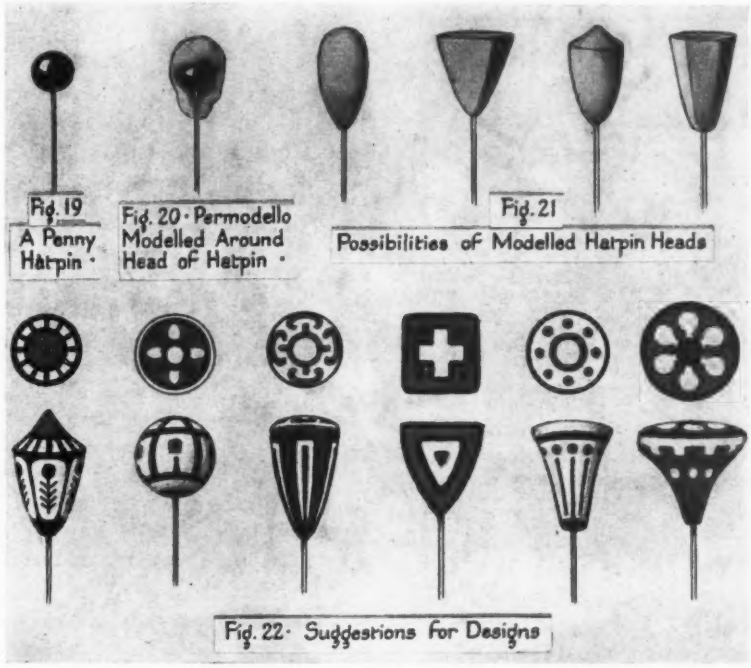


Fig. 19
A Penny Hatpin.
Fig. 20 · Permodello Modelled Around Head of Hatpin.
Fig. 21
Possibilities of Modelled Hatpin Heads
Fig. 22 · Suggestions for Designs

STEPS IN MODELING HAT PIN HEADS AND DESIGNS.

modeled form while it is still moist. Figs. 13 to 16 illustrate the former process. A knot is tied near the end of a cord, and a lump of Permodello is modeled around it, so that the knot becomes imbedded. The form is shaped around knot and cord. An additional bead may be modeled above the main shape, as shown in Fig. 16. The pendant is then ready for the painted decoration. Fig. 17 shows a group of painted pendants, all of which are modifications of cylindric forms. Fig. 18 suggests other forms which are begun in the same way but whose shapes have been flattened and otherwise modified to secure interest and variety. It is entirely permissible to use a modeling tool of some sort in making these different forms. A knife blade, an orange wood stick, a toothpick or any other simple device can often be used to advantage.

In decorating beads and pendants, observe that realism is avoided. Lines, dots, squares, circles, and usually needed in decorating hatpin heads, one for the top and another for the sides. Fig. 22 shows a number of suggestions. Note the simplicity of the modeled forms. A bright system of lines and dots, painted in strong contrasts of color values, holds the hatpin in place as a jewelled decoration.

A coat of varnish keeps the color brilliant and protects the hatpin from wear.

Permodello Lavallieres.

The lavalliere is a form of necklace. It is really a development of the bead and pendant idea. For centuries the women of all nations have delighted in hanging strings of jewels about their necks. The lavalliere appeals especially to girls of all ages. Quite appropriately, a brilliant spot of color should appear at the throat, attracting attention to the face, where interest should center. The modeling of the lavalliere is an excellent high school problem. Chinese cords

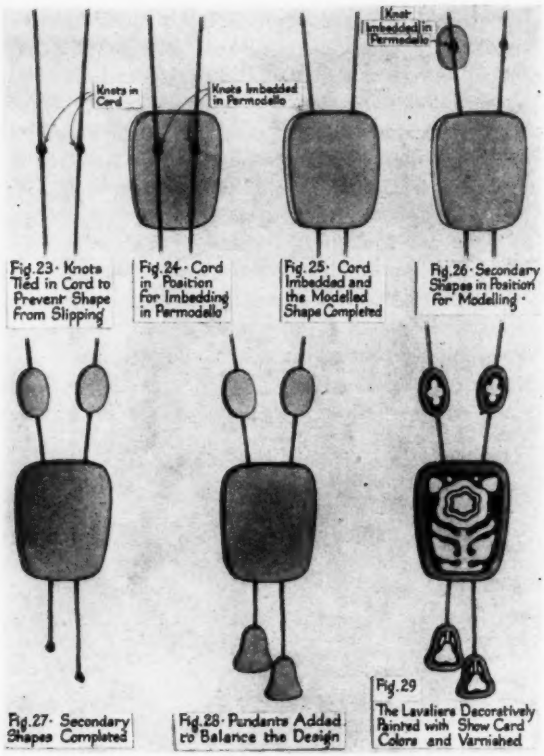


Fig. 23 · Knots Tied in Cord to Prevent Shape From Slipping

Fig. 24 · Cord in Position for Imbedding in Permodello

Fig. 25 · Cord Imbedded and the Modelled Shape Completed

Fig. 26 · Secondary Shapes in Position for Modelling ·

Fig. 27 · Secondary Shapes Completed

Fig. 28 · Pendants Added to Balance the Design

Fig. 29
The Lavaliere Decoratively Painted with Show Card Colors and Varnished

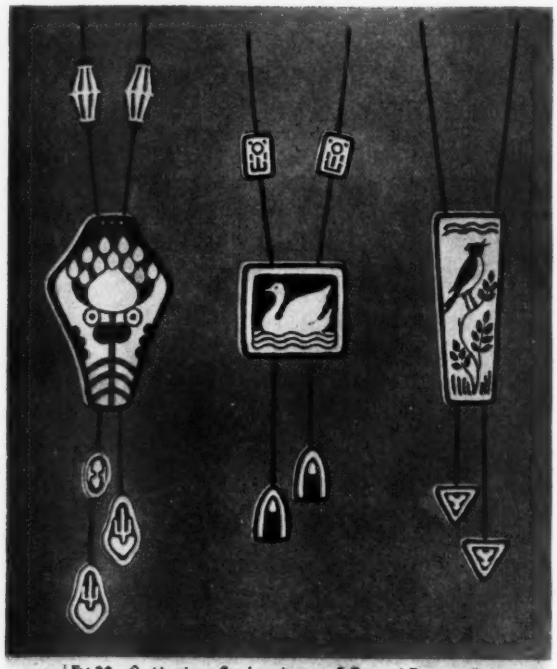


Fig. 30 · Suggestions for Lavalieres of Painted Permodello

of strong color and firm texture are best adapted to the purpose, in designing lavallieres. A thick, narrow ribbon, a braid or trimming cord may be substituted for the Chinese cord, if this is not available. For one lavalliere about a yard of cord is necessary. Knots are tied near the ends of this cord, as shown in Fig. 23. These knots are next imbedded in the mass of Permodello which is to form the main shape in the finished lavalliere. This process results in a loop of cord, which is slipped over the head when the lavalliere is completed. Secondary shapes may be modeled on the cord, to support the main shape, and pendants are added at the end, to complete the design and to add the necessary element of variety. Figs. 24 to 28 illustrate these steps. Fig. 29 shows a finished lavalliere in actual size, except for the loop of cord which goes around the neck, supporting the decorative shapes. These shapes are modeled to a thickness of about three-sixteenths of an inch. The designs are painted with opaque water colors. Varnish is added as a finishing coat. Fig. 30 shows three additional designs for lavallieres. In each there is a dominating spot of interest. The pendants are distinctly subordinated. All decorations on pendants, subordinate spots, and on the main shape, are treated in absolutely flat color tones. The swan shape is flat; the bird shape is flat; the flower shape is flat. There is no suggestion of realism, anywhere. This is a lesson hard to teach to those who have been trained in the old school of representative drawing. Representation is not art. Art lies in the ability to use the suggestion which Nature presents so that the result expresses one's own thought and individuality.

Permodello projects are popular with the public because they appeal to the universal feminine taste. The things described in this article find a ready market when offered at the school bazaar. Beads bring from ten to twenty cents a piece. A string of beads will sell at seventy-five cents or a dollar. Hatpins sell for a dollar or a dollar and a half. Lavallieres attract purchasers who are glad to pay from two to five dollars, according to the elaborateness or the individuality of the design. Permodello modeling is, therefore, one of the most practical and interesting of the new mediums which Industrial Art has introduced into our school courses.

IT is desirable in every way that men of good education should be brought back into the productive of crafts: there are more than enough of us "in the city," and it is probable that more consideration will be given in this century than in the last, to Design and Workmanship.

—*W. R. Lethaby.*

Lettering Essentials for the Commercial Design Student

Elizabeth Weiffenbach, Lafayette High School, Buffalo, N. Y.

(Part II)

IT may seem strange to switch from the simplified Roman letter, in the January issue of the *Industrial-Arts Magazine*, to the Block letter. But Classic Roman, which is invariably placed first in books on lettering, is the most difficult letter for the average student to attempt. He does very well with the single stroke Roman if that is studied first, but falls down hard on the real thing. It is not going too far to say that it takes a master of lettering to draw well the Classic Roman with its beautiful refinements of proportion and construction. The modern Gothic, Commercial Gothic, German Gothic, or Block letter (all meaning about the same thing) are quite easy to

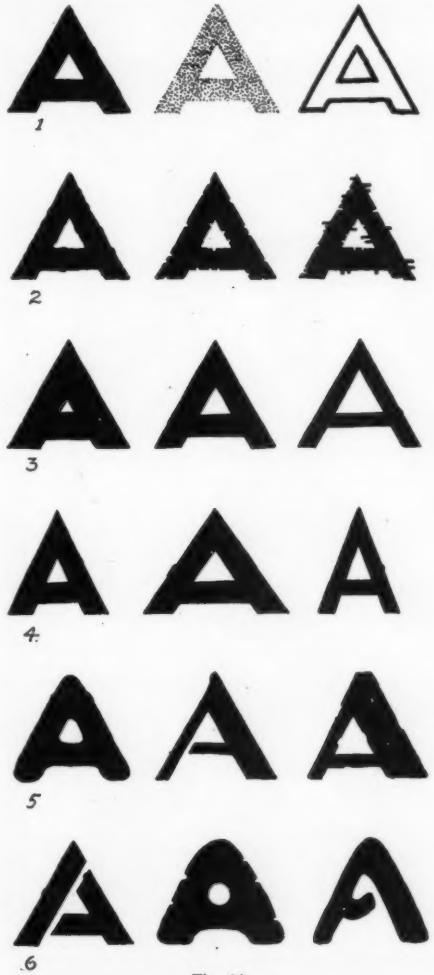


Fig 11.

Fig. 13.

Fig. 14.

Editor's Note. — This paper is one of a series on Commercial Art Instruction to appear in the *Industrial-Arts Magazine* and to form part of a textbook. All rights are reserved. Figs. 11, 12, 23 and 28 are original designs of the author. Fig 13 was drawn by Armin Perry; Fig. 14, by Irving Morgan; Figs. 15-16, by Newell C. Stewart; all students in the Lafayette High School, Buffalo. Figs. 17, 18, 26, 29 and 30 are from recent magazine advertisements. Fig. 19 is a booklet cover by Raymond P. Ensign, Pratt Institute, and Fig. 20 is a booklet cover.

draw in comparison with the Roman, and are very much used in commercial design.

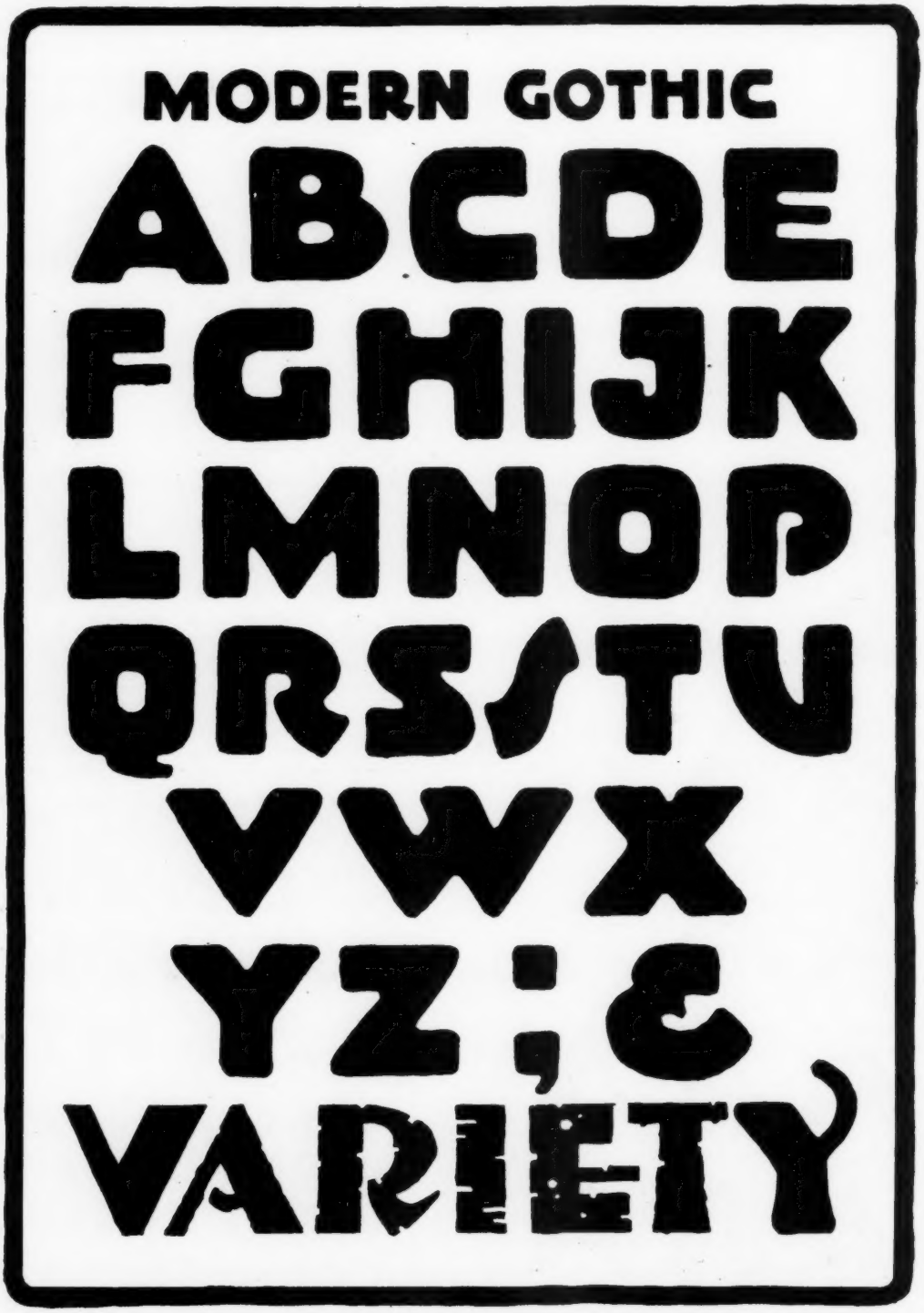


FIG. 12. MODERN GOTHIC ALPHABET

The Block Letter.

The "Block" style of letter permits an unlimited amount of variety. The individual can make over the letters to suit his purpose, and they can be refined or clumsy, thick or thin, in fact anything he chooses to make them. Take the letter "A," for example (Fig. 11), and notice that in one there is shown a difference in value; in two a difference in outline;

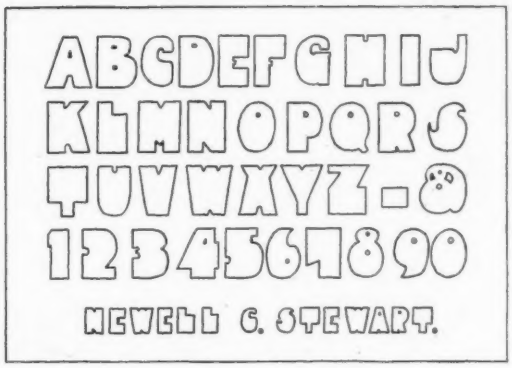


Fig. 15.

Fig. 16.

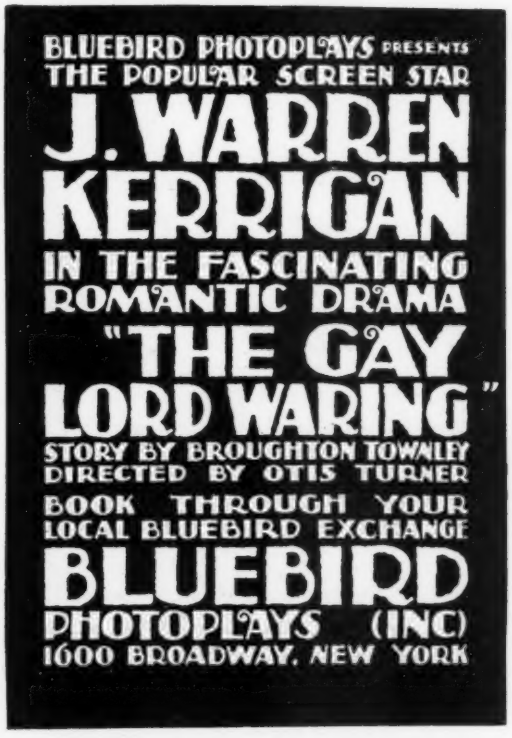

BLUEBIRD PHOTOPLAYS PRESENTS
THE POPULAR SCREEN STAR
J. WARREN KERRIGAN
IN THE FASCINATING ROMANTIC DRAMA
"THE GAY LORD WARING"
STORY BY BROUGHTON TOWNLEY
DIRECTED BY OTIS TURNER
BOOK THROUGH YOUR LOCAL BLUEBIRD EXCHANGE
BLUEBIRD PHOTOPLAYS (INC)
1600 BROADWAY, NEW YORK

Fig. 17. Application of Block Letter to Poster.

in three variety of thickness; in four variety of width and shape; in five and six a great difference in character as well as form. The shapes of number five could have the outlines of number two, etc. Note

Fig. 18.

that one, two, five, and six are the same width. These could be varied also. Eighteen renderings of "A" are shown, several are suggested and many others are possible.

The pupil should be encouraged in the very beginning of his work in lettering with the thought that his own taste and judgment are of great value and that there need not be a slavish imitation of other people's ideas. Originality is always welcome.

Figure 12 shows the capitals arranged in a panel, and the word Variety suggests still other possibilities of this style. Figs. 13, 14, 15, 16 were drawn by high school students after just as much training in lettering

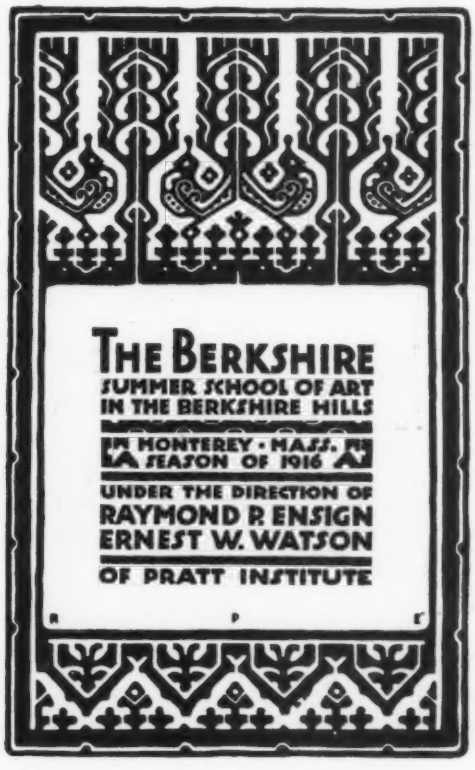


Fig. 19.

Fig. 20.

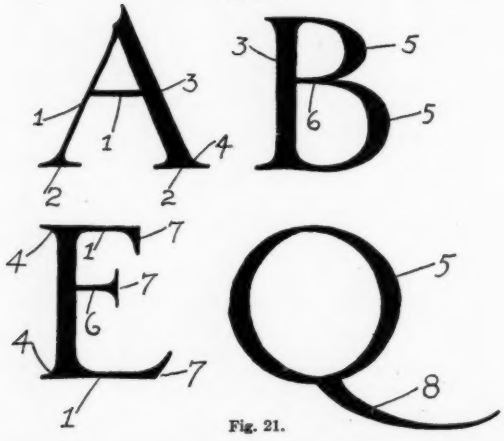


Fig. 21.

Fig. 22.

Fig. 23.

as has been suggested so far in this work. Figs. 17, 18, 19, 20 are commercial examples. Notice how well this style of lettering lends itself to panel grouping. It can be stretched out or condensed to great advantage. The proportions of large and small letters are easily handled. These particular examples emphasize lettering more than design. There are hundreds of examples to be found where this type

Fig. 24.

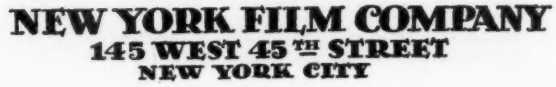


Fig. 25.

P. T. FRANKL
101 PARK AVE * MURRAY HILL 6984
Modern Interiors for the Home, Office & Store
PERMANENT EXHIBITION
of exceptional Art Goods.

Fig. 26.

Fig. 27.

Fig. 28.

has been used in design, but subordinated to the design itself.

Bold Roman.

The third style of lettering to draw and one which is somewhat more difficult for the student than the Modern Gothic is the Bold Roman. This style has perhaps the greatest possibilities for commercial design purposes. It presents opportunities for much variety and individuality, and can be changed to suit the character of the article advertised.

Before copying this type of letter, it will be of great help to review the names of the various parts of the letters (Fig. 1, page 22, January Magazine, and Fig. 21). It is by changing the thickness of the stems, cross bars, hair lines, etc., that variety and character come about. Notice what remarkable changes occur in the printed letters in Fig. 22.

Figure 23 shows a modern type of Bold Roman and includes an appropriate lower-case, numerals, decorative units, etc. Great effort was made to have

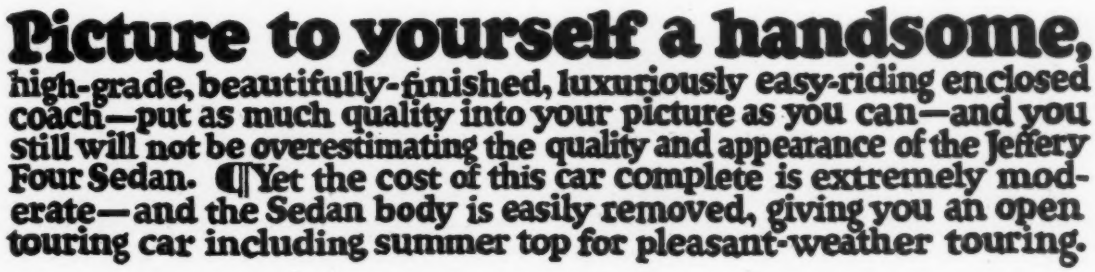

Picture to yourself a handsome,
high-grade, beautifully-finished, luxuriously easy-riding enclosed coach—put as much quality into your picture as you can—and you still will not be overestimating the quality and appearance of the Jeffery Four Sedan. ¶ Yet the cost of this car complete is extremely moderate—and the Sedan body is easily removed, giving you an open touring car including summer top for pleasant-weather touring.

Fig. 29.

the arrangement of these items form a well designed sheet.

The essential difference between the Block letter and the Roman is: (a) The latter has serifs and the former has none; (b) the Block letter is nearly always composed of parts of uniform thickness and the Roman *always* has uniform thick and thin parts; (c) the Block letter never extends above or below guide lines, whereas the Roman may have serifs above or below the guide lines. These facts are perfectly obvious to a well trained designer, but must be most emphatically brought home to the beginner.

Figures 24, 25, 26 are clippings from various sources, illustrating an interesting modern Roman letter. Fig. 27 represents freely drawn headings in a department store magazine.

Fig. 30.

Figure 28 is a very forceful Roman letter and forms a great contrast to the Classic Roman from which it was originally descended. Figs. 29 and 30 are commercial examples of this type.

With the training in lettering and design suggested by the foregoing paragraphs and illustrations the student is now ready to attempt the Classic Roman.

MATHEMATICS FOR THE APPRENTICE

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Central Continuation School, Milwaukee, Wis.

IN these days of rapid industrial progress, shop mathematics assumes a more and more important place in the training of the future mechanic. New types of machine tools, the greater complexity of present day work, and the increased accuracy which is required by the modern system of interchangeable manufacturing, all demand a knowledge of arithmetic and mathematics far beyond that required of the mechanic of fifty or even twenty years ago. As a direct result of the conditions enumerated above, the old-time shop man, with his large fund of practical knowledge, and his meager supply of technical information, is rapidly succumbing to the inexorable law of the survival of the fittest. To meet present day requirements, therefore, the training of the apprentice should include a generous share of mathematical instruction.

With the need of a thoro course in shop mathematics for the apprentice admitted, the question arises at once, What should be included under the heading, and how should it be taught? This article is an attempt to answer these questions, and the writers hope that the suggestions herein made may be found useful, not only by the industrial teachers who are now engaged in the work of educating the recruits of our vast industrial army, but also to the mechanic who aspires to take up the teaching of industrial subjects as a vocation. The discussion is based on the experience which we have gained teaching shop mathematics for several years, to classes of young men who are indentured in the following trades: machinist, toolmaker, patternmaker, boiler maker, templet maker, blacksmith, foundryman, and draftsman.

In order to show just why we pursue the methods which we outline below, it would be well to say a few words about the personnel of our classes. A typical apprentice class contains from fifteen to twenty pupils, whose ages range from 16 to 24 years. Their previous education varies as much as their ages. To complicate matters the different members of the class are usually not indentured in the same trade, but may be apprenticed in any of the above enumerated callings. Furthermore, the newcomer may find himself seated beside a classmate who has almost finished his apprenticeship. Then, too, the exigencies of shop conditions frequently require that a boy who belongs to one class be changed to a class meeting on a different day. With these rather complicated conditions in mind, it becomes apparent that class instruction in mathematics is out of the question. Let us then study the procedure which is followed when a new student is enrolled.

The applicant is first given a simple entrance examination, which is designed to test his knowledge of arithmetic, up to and including fractions. The results which we have obtained from these tests prove that most of the boys who enter our classes require a thoro review in elementary arithmetic. This condition is due no doubt to the fact that the new apprentice has been away from school for a space of time which varies from a few months to several years. He has had little or no chance to make use of the arithmetic which he previously learned, and hence has forgotten most of it. The first thing, then, is to arouse new interest in the subject by choosing the problems, not from textbooks found in the graded schools, but from the everyday requirements of the shop. The outcome of the above mentioned test determines whether the boy can be advanced, or if further review is necessary. If the newcomer shows that he is conversant with the elementary work, he is at once advanced to the more technical part of the course. We have found, however, that even high school students cannot be allowed to omit too much of the first part of the course, for the reason that shop

mathematics, like technical English, is a branch of its own, and needs careful study.

It may be well to say a few words here about the method of instruction which is to be followed with a given class. The instructor will quickly discover that a plan which works out admirably with one class will be ill adapted when applied to another. If a given class can be divided into groups, the members of which are all engaged upon the same lesson, the instructional work will be much simplified. But this cannot be done in many cases, and individual instruction must be resorted to. For this reason the course in shop mathematics is divided into lessons which are assigned individually as each student progresses.

The advantages of this last system are:

(a) Each student is an independent unit, and for that reason the work which is assigned to him may be totally different from that of any other member of the class.

(b) The pupil's progress is suited to his personal ability.

(c) Absence from class does not upset the lesson plan; when the pupil returns, he starts from the point where he left off.

The disadvantages are:

(a) The individual lesson plan takes away the incentive of competing with others who are engaged upon the same task.

(b) A pupil may hand in creditable work, week after week, and yet not fully understand the principles which are involved in the subject matter which he has covered.

With these objections in mind, corrective measures must be applied to remove them. To furnish somewhat of the competitive spirit, each lesson has been given a time allotment within which a slow, average, or rapid pupil can finish the work. A chart upon which the time allotment for each lesson is shown is posted in the classroom, and the pupils, when they have finished a lesson, are sent to compare their time with that of the chart. It has been found that most pupils readily fall in with the idea, and strive to finish their lessons in record time. At the start, the time allotment was arbitrarily set, and then corrected later on, when definite information had been obtained from the actual working time required by the different grades of pupils.

To overcome the second objection, frequent quizzes in the form of lessons on miscellaneous problems are given. These tests must be designed in such a manner that they will disclose the weak points in the pupil's grasp of any part of the subject, and if the results of the examination warrant it, the student is required to review that portion of the course in which his knowledge has been found deficient. The review lessons, in all cases, are supplementary to the regular work, so that the student has new problems to solve, altho the principles which are involved are the same as in the regular lessons which have been previously taken.

Many pupils find it an incentive to know the nature and the quantity of the work which is ahead of them. In order to satisfy this commendable curiosity, the beforementioned chart was amplified so that it contains, besides the time allotments for each lesson, the following information:

(a) The number of the lessons.

(b) The special subject to which each lesson is devoted.

(c) A condensed summary of the principles which are involved in each lesson.

Besides the foregoing information, the chart contains a number of rules, formulae, and constants, which are used thruout the course, and to which the student can refer whenever occasion arises. The habit thus formed by the student who looks up his own information, instead of asking the instructor for it, is of great value in the shop where charts and tables must frequently be referred to, when certain machine operations are performed. To still further impress the pupil with the value of information which one has personally collected, each member of the class is required to furnish himself with a notebook in which useful data, formulas, and the like must be copied as he advances.

A word of explanation as to the lessons which are used in our classes may now be in order. Numerous textbooks can be found in the market, under the name of "Shop Arithmetic," "Shop Mathematics," "Industrial Mathematics," etc., but not all of them are available for use in apprentice classes. Some of these books contain admirable subject matter, but nearly all of them are open to the objection that they are arranged primarily for the machinist. It is true, much of the elementary work in arithmetic which these books contain can be profitably studied by boys who are indentured in any trade. Each trade, however, has distinctive problems, and it is natural that the apprentice should evince the most interest in those problems which are applicable to the trade which he is learning. To satisfy the wants of the pupil, therefore, it is necessary for the teacher to write up many of the lessons. In order to devise the proper kind of problems, a thoro understanding of the requirements of the trade for which the lesson is designed is of course presupposed. If the teacher has no practical experience in the given trade himself, the suggestions of an able journeyman may be profitably followed. Visits to the shops and talks with foremen often result in information from which valuable data for lessons can be obtained. Trade catalogs form another source from which many hints can be gathered upon which to base a lesson. Thus, many problems on pulley and gear speeds can be worked up from information obtained from machine tool catalogs. Rules on the reading of micrometers or vernier calipers, notes on the calculation of gear

tooth sizes, the kind of gear cutters to be used, the shrinkage allowance to be made, and many other helpful facts can be obtained from the same source. We have investigated many textbooks, and call attention to the following list of books which we think are worth commending.

Shop Arithmetic, Norris and Smith, McGraw-Hill Book Co.

Advanced Shop Mathematics, Smith and Craigo, McGraw-Hill Book Co.

Practical Mathematics, C. I. Palmer, McGraw-Hill Book Co.

Shop Mathematics, E. E. Holton, The Taylor-Holden Co.

Machine Shop Arithmetic, Colvin & Cheney, The N. W. Henley Pub. Co.

Industrial Arithmetic, White and Colgrove, Webb Pub. Co.

Machinery's Jig Sheets, The Industrial Press.

Machinery's Reference Books, Nos. 18, 19, 52, 54, and 55, The Industrial Press.

Industrial Mathematics, H. W. Marsh, John Wiley & Sons.

Vocational Mathematics, W. H. Dooley, D. C. Heath & Co.

After several years of experimentation, however, we have developed a series of lessons in mimeographed form, which we are now using in our classes. In these lessons we have embodied some of the things we deem helpful to the apprentice, and which we have not found in any shop arithmetic textbook. For instance; we have included a lesson on trade discounts in our course in order to prepare our apprentices to check up bills for machine tools or shop appliances which they may be called upon to install. Of course, the auditing department usually takes care of the checking up of bills, but in many small shops the foreman or superintendent is held responsible for all shop accounts. We have also devised numerous lessons for pattern-makers, toolmakers, blacksmiths, boiler-makers, templet-makers, draftsmen, foundrymen, etc., which we were not able to find in any textbook. Some of the lessons which we have prepared contain explanatory matter and examples, while others consist of problems only.

The instructor who attempts to use the individual lesson sheet plan will find it necessary, almost from the start, to have all of the lessons for a given course in readiness for use. The proper kind of lesson in shop mathematics cannot be written up on the spur of a moment. Much time and thought has to be put upon each lesson, and the work can be carried on successfully only when a definite plan is followed. To have the classwork run smoothly, therefore, write up the lessons according to a well developed outline, and next have the lessons written up well in advance of the pupils. A few good auxiliary textbooks will be found very useful for assigning extra problems and for reference work.

In the arrangement of our lessons, we were very careful to avoid making the lessons so lengthy as to be tiresome. A short lesson, which contains the right kind of information, emphasizes a principle fully as much as a long, tedious task. The object of each lesson must be to impart a given amount of information. After the boy's attention has been called to this information, he must be shown how to apply it to his work, and then receive enough drill to fix the facts in his memory. This can readily be done by including similar problems in succeeding lessons. In this way the information is brought before his mind again and again, and yet the repetition does not become tedious.

We have also refrained from placing too great an emphasis on the memorizing of definitions. Many persons know how to solve a problem involving subtraction, and yet are totally ignorant as to the meaning of the terms minuend, subtrahend, etc., and this ignorance in no wise detracts from their ability to work the problem correctly. Of course there are some students who wish to be fully informed as to these terms but this information should not be over-emphasized. If a pupil has been shown the method of working a problem and is found able to apply the proper rules and thus obtain an intelligent solution, the instructor can feel satisfied that the boy is really getting something worth while. It must be understood, however, that we do not advocate the omission of all definitions. The teacher must use good judgment in deciding which definitions to retain and which to cast out. The contention has been made that it is folly to teach apprentices how to find the least common denominator, because the practical man has no use for such knowledge. We believe that this is rather an extreme view to take, and hold that the mathematical training of the apprentice should not be limited to a few rule of thumb methods, but should be as broad and as thoro as possible, even tho the practical side receives special emphasis.

In choosing problems for our course, we were also careful to avoid those having no other function than to keep the pupil busy. There is so much work to be accomplished that mere busy work has no place in the arithmetic which is to be taught to our future mechanics. It is equally necessary, however, that care be exercised in choosing such problems as the student may reasonably be expected to meet in his work. Thus the problem: find 7-16 of 8 17-325, tho it may furnish excellent practice in multiplication, has absolutely no practical value, and should therefore be avoided. Problems which require a reversed method of attack for the solution should also be avoided, unless they are found to arise in practical work. For instance, an example which requires the student to determine the number of bolts which can be bought for $1.50, when the price of one bolt is $2\frac{3}{4}$¢, is impractical, because such a case would not arise in the ordinary way of buying goods, while a

problem in which the student must calculate how many bolts, each of which requires 5 3-16 inches of stock, can be cut from a bar eight feet long, would be thoroly practical, for such calculations must be made, in many instances, before the stock for a certain job can be ordered.

The instructor will find it advantageous to have numerous models and mechanical aids to assist the class in visualizing mathematical work. We have found one-inch boards of various lengths and widths, scribed off into one-inch cubes, very helpful in the explanation of problems involving areas and volumes. A piece of tin cut into an eight by eight square, and another piece of the same tin cut into an eight-inch circle, may be separately weighed on a suitable scale, in order to show the pupil that the area of a circle is

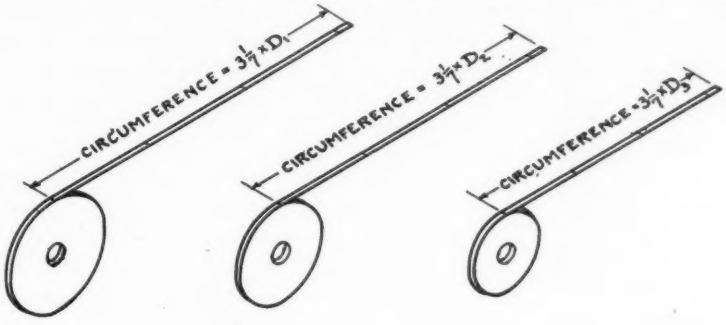

FIG. 1.

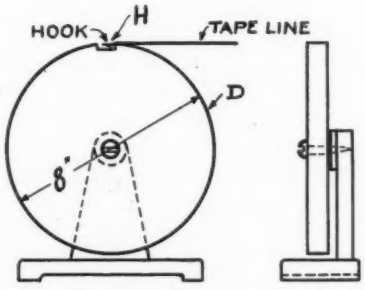

FIG. 2.

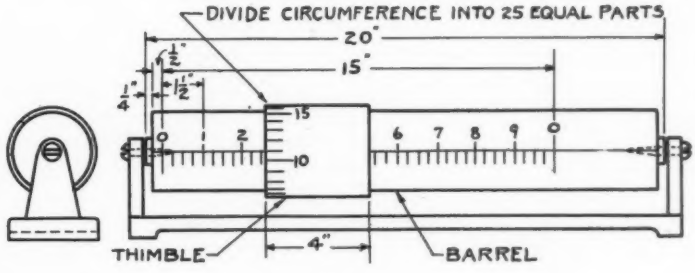

FIG. 3.

equal in length to the diameter of the circle. We also make use of several wooden discs, of different diameters, each of thich is accompanied by a strip of paper equal in length to its respective circumference. On these circumference strips, the diameter is laid off (see Fig. 1) so that the pupil can plainly see how the value of "pi" was originally obtained, and what that value is. The same discs can be used to form miniature belt transmission systems wherewith to demonstrate pulley speed and speed ratio problems. Cutting speeds, surface speeds, rim speeds, etc., can be made real to the student, by using a disc to represent a piece of lathe work for which the cutting speed is to be figured out; or the disc may be used to represent the emery wheel for which the surface speed is wanted; or fly wheel or pulley, for which the rim speed is to be calculated. To illustrate, take a problem like the following: How many revolutions must an 8" shaft make in a lathe to have a cutting speed of 30 feet per minute? To assist the student in picturing this problem, the model shown by Fig. 2 is made use of. A tape line or a strip of drawing paper can be fastened to hook H, and wound once around the disc D. Then by revolving the disc in the reverse direction, the tape line or paper strip will unwind, and the student can readily see that the length of the chip, for one revolution, must be equal to the circumference of the work. This circumference must of course be expressed in feet. It may be well to explain to the pupil that great accuracy is not required in problems of this kind, and that approximate answers are sufficiently close for practical work. For this reason the value of "pi" may be taken as 3, and hence the chip in the above case, for one revolution, would be $\frac{8 \times 3}{12} = 2$ feet in length. The student usually has no trouble in giving the correct answer to the question: If a chip 2 feet in length is obtained when the work makes one revolution, how many revolutions must it make to cut a chip 6 feet long? The student thus reasons out just what arithmetical operations he must make use of in the solution of his own problem, and the method becomes much more real to him than if he had worked from a formula only. After the demonstration with the last mentioned piece of apparatus, the formula $n = \frac{12\,C}{3d} = \frac{4\,C}{d}$ can be explained, and the pupil should be allowed to use it for similar problems. For the pattern-maker, the revolutions required by a 12" circular saw to obtain a certain

cutting speed, say 900 feet per minute, may be substituted in the above problem.

For teaching the reading of the micrometer, it is well to use an inch-micrometer, and have the student measure a definite piece, the dimensions of which are known to the instructor. We have a measuring piece of machine steel, about $4\frac{3}{8}$ inches long, on which seven steps, each $\frac{5}{8}$ inches in length, are turned up. The steps have been turned to the following dimensions: .409″, .510″, .594″, .647″, .754″, .812″, and .943″. The pupil measures this piece and writes down the diameters so that the instructor can check the readings when the lesson is finished. In some schools the cost of the micrometer may act as a deterrent to the adoption of the plan just outlined, and the teacher must devise some other means to obtain results. A very creditable substitute may be made with a large mailing tube (one which is about three inches in diameter answers nicely) which fits snugly over a wooden cylinder, as per Fig. 3. The mailing tube takes the place of the thimble, and the wooden cylinder represents the barrel of the micrometer. Both tube and cylinder should receive several coats of orange shellac, and the graduations can then be marked on with black shellac. The tube can be revolved and set at will on the cylinder, and thus any setting on the real micrometer can be duplicated. A further advantage of this improvised piece of apparatus is, that its size will allow it to be used for class demonstrations, which can not be done with the ordinary micrometer.

A few words on the question of checking and grading the lessons may be of assistance. When a pupil has finished a lesson, it is at once checked up. If any of the problems are worked incorrectly, they have to be worked over. This means that when the lesson is finally handed in, all the work is correct, and that if the lessons were graded in the ordinary way, a mark of 100 would have to be given. This would obviously be unfair, because some finished lessons are very much neater than others. Furthermore, one pupil may finish his lesson in one hour, while another would spend five hours on the same task. We have therefore devised the following scheme. The minimum passing grade is 70%. If a lower mark than this is obtained, another lesson with similar problems has to be worked. To take cognizance of the time element as well as neatness, a normal grade has been assigned to each of the three classifications which are named on the time allotment chart. Thus, a pupil who does neat work and finishes any lesson in the time set for the rapid class, gets a mark of 95%. The same grade of work finished in average time 85%, and if finished within the slow time limit 75%. The following table shows how this normal grade is increased or decreased by greater or less speed or neatness:

	Rapid	Average	Slow
Very neat	97%	87%	77%
Neat	95%	85%	75%
Fairly neat	93%	83%	73%
Passably neat	90%	80%	70%

If a lesson is finished 10% to 25% ahead of time, add 3% to the above ratings.

If 10% to 25% more time than the allotment is required to finish a given lesson, deduct 3% from the above ratings.

From the above table it is evident that when a pupil finishes his lesson in less than the average time, and does very neat work, he gets a grade of 87+3=90%, which is the same as that obtained by a pupil who does passably neat but rapid work. The method of grading outlined above need not of course be strictly followed. The table was devised merely as a basis, so that the grading becomes more a matter of calculation than of chance.

In order to expedite the checking up of the lessons, an answer book has been arranged which contains the answers to all the problems in the course. A few pertinent questions have been written beneath the answers belonging to each lesson. When the instructor is checking up the paper which a pupil has just handed in, these questions can be put to the student, and it becomes apparent at once whether the principles which are embodied in the lesson have been acquired and understood. The instructor is thus saved the mental strain involved in recalling the proper question when he checks up a lesson. This will be found to be a greater aid than one would imagine at first sight, because the lessons which are completed in a single half day range from the elementary to the most advanced.

To summarize, mathematics for the apprentice is of such vital importance that it deserves the best efforts of the teacher. The first step in successfully teaching the subject is to make the pupil feel that shop mathematics is one of the elements upon which his success as a mechanic depends. To further arouse interest, the lessons must be vitalized with practical rather than abstract problems. Every effort must be made to assist the student in visualizing problems which he does not understand, so that the underlying principles are brought within his grasp.

When we have succeeded in making the future mechanic see that the solution of a shop problem requires the application of common sense, rather than an effort to unravel a mystery, then we can truthfully say that we are pursuing the right course, and that we are approaching the goal for which we are striving.

In every rank, or great or small
'Tis industry supports us all.
—*Gay.*

A NEW KIND OF TOYLAND

Eleanor M. Waigli, Principal Maryland Avenue School,
Emily M. Dorn, Supervisor of Drawing,
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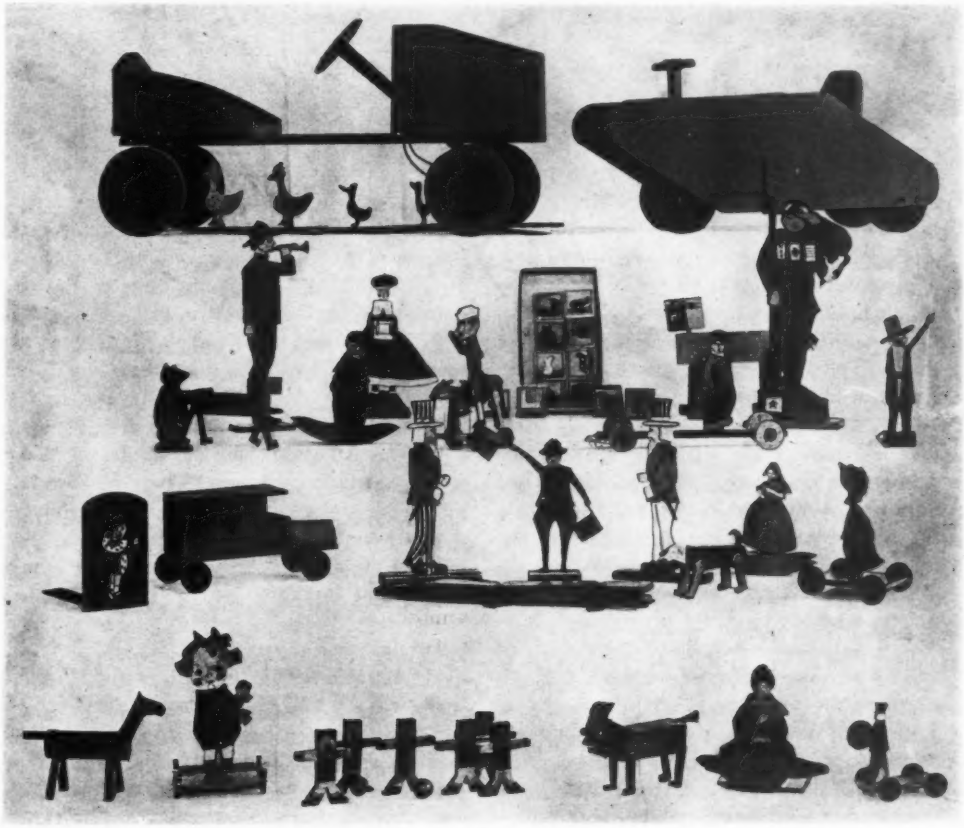
THE Toy Shop pictured in the photographs is a bit different both in cause and effect from that of the recognized commercial variety, altho there, too, one seems filled, upon entrance, with the limit of interest and amazement at the cleverness of the toy designer, at the ability of the inventor of the mechanical toy. you'll be a child with the children. TOYS! With the word one sees "miles of smiles," alike from seven and from seventy. Teachers and pupils vie with each other for the opportunity of handling them, of showing them, of explaining their "fine points." You will meet the wonderful, orange colored goat, black spotted, with eyes of wooden beads in a head shaped from a



A FEW OF THE TOYS MADE IN THE MARYLAND AVENUE SCHOOL, MILWAUKEE.

That of the Maryland Avenue School is a Toy Shop *of* the children, *by* the children, *for* the children, that the joy of creative fancy shall not perish from the schoolroom. On the display tables stand the work of some 300 children, of grades five, six, seven, and eight. That sounds commonplace enough. But look about—whether you be a hard headed, even accused-of-being-a-hard-hearted, business man, or whether you be a more easily moved feminine person who deals daily with children, the sentiment back of each bit of childish creation will *get* you. As your mind begins to grasp it all the force of it will strike your heart. It was heart, head, and hand that created it, and head and heart will understand. The eye will grow misty and the throat tense. Then, soon, you'll be smiling, wood block and set on a movable pivot based on a block body—eyes contemplating, ruminating. You will meet the gnome ninepins, the rocking, balancing, wingflapping duck, the "squared animals" of the Noah's ark, and the dog of a thousand tricks, standing at the right of the ark. Could you but see his tail,—vibrant, ready to wag ecstatically at the smile from you—made of a section of one of the little green snakes found at the favor table of the caterers about Saint Patrick's Day!

How can we tear ourselves from the toys themselves to study the underlying purposes of the project! It was initiated by the drawing department in proving freehand drawing a vital and basic element in creative handwork. Copying has been the bane of handwork

A FEW OF THE TOYS.

—of drawing, of design, of construction, of manual training. An opportunity for application to a live interest was given with the new slogan of *Education* as the basic principle of Junior Red Cross activities, with this year's program of "service, citizenship, health." Service includes not only the generally accepted meaning, but as well the development of the child's abilities so he may be worth more both to himself and to his country, and with the fruits of this great development he again serves those in need. But instead of emphasis having been placed on the *quantity* of production, and the resultant immediate gain in the greater cash fund, it has been placed on the *individuality* of the production. He was not to make something by the dozen, he was not to speed up production,—he was to have *all* the time for the development of his project to as great a degree as he was mentally and manually capable. We wiped out all past, preconceived notions of making things like somebody else's—started fresh with a "clean slate"—eliminated the "pattern" (so dear to hearts galore) that could be borrowed from someone who had before made a successful model. Each child's project was to be absolutely his own independent choice in the application of his freehand drawing to a problem in construction.

In the development it was first necessary to create an "atmosphere"—to bring to the children suggestions, materials, ideals,—to show them toys, pictures, color schemes,—to analyze principles of construction,—but to keep before them the thought, "someone else created that; it is not mine to use," yet to leave them at liberty to look the world over for ideas, for methods of construction, to pick and choose those they needed, to re-apply and re-create so that the things which finally resulted were theirs.

While each child was thinking, and planning his project, the classroom work in drawing was pose and animal sketching, thru which he was getting knowledge of form, proportion, and action: a sketching expedition to the Zoo aids in giving information galore. Reference to the photographs of the signalling Boy Scout, the Uncle Sams, the bugler, the orator, etc., shows the final application of pose-work, while the dogs, horses, and other animals, are a reflex of animal sketching, with the thought that toys should not be an *imitation* of nature but a suggestion. The child cannot create without the storehouse of mental concepts which he has been accumulating thru his years of representative drawing—form, perspective, illustration, constructive and decorative design.

He now gathers from these sheets of sketches the various items which he needs, and makes rough sketches of the new thing which he wishes to create. These are discussed as to interest, attractiveness, possibility of construction. If found impracticable, modifications result thru suggestion. At this point the work is by far the most difficult for the teacher to handle, if it be conducted in the spirit in which the project was conceived. After study and experiment with size, proportion, and action, the child draws an exact pattern of each part. This is then taken to the shop and traced on wood, for cutting. During the days the shop work is being carried on the pattern is returned to the drawing class where the lessons are devoted to planning and painting on it the color scheme to be painted later on the wood.

The coloring of the toy must be considered a lesson in design. In general the color should not be an *imitation* of nature, but an arrangement of color spaces. Also, the color might be quite a bit stronger than for many of the previous projects in the decoration of cardboard construction, where "greyed" color adds much to the beauty of the article. The decorative treatment, with heavy lines outlining spaces, and flat colors filled in, is worked out, ready to trace on the wood and paint.

Upon the completion of the shopwork, the models are returned to the drawing classes, where they are

painted according to the colored pattern, and then taken back to the shop for the coat of shellac or of varnish.

This history sounds quite simple and runs smoothly. But the thing which cannot be told, for which one cannot give directions, that which translates all the latent powers into action—is the *leadership*. To merely say to the child "make anything you wish," is a mediocre leadership not worthy of the name. To superimpose one's individuality upon the child so the resultant article becomes the teacher's, not the child's, is dictation, not education. To so lead that the child is not satisfied with his idea or his execution of it until he has developed it, until he has, by suggestion, carried onward to the limit of his mental and manual ability, requires a tremendous patience and self-control,—but it is Leadership.

Children are so accumstomed to being specifically directed that here lay another difficulty—they had the freedom of choice but did not know how to go about using it. So here, thru an intensely interesting project, was the great opportunity for the development of initiative, of resourcefulness, of independent thinking, of originality, of responsibility. No easy teaching, this! But to the child the results are immeasurable.

The tale would be indeed incomplete were no mention made of the splendid co-operation—the team work of the classroom instructors and the manual training instructor; of the concentrated interest and enthusiasm of the children—the days were all too short and too few; of the interest of the home folks, who from day to day thrilled to each new chapter in the serial tale of how each denizen of Toyland was progressing.

The financial returns were sufficient to pay expenses and to readopt the three French orphans, "fathered" during the past year with the funds earned thru the building's share of the Community Toy Sale, initiated and organized by the Milwaukee School Drawing Department in December, 1917. The fact of the earning power for this purpose of service was the recompense for parting with each well loved treasure.

Could the evolution of each gift have been written, it would have been a throbbing little history of hopes and fears, of many smiles, and sometimes, even tears. Could it have accompanied the toy into the possession of the purchaser, there would have resulted a very tender feeling toward it, for it was endowed with a personality quite different from that of the ordinary machine made article.

The *idea*, dormant in the child's mind, had been crystallized and developed, and thru every stage of creation the result was the product of loving thought and hand.

Wood. This year it was very difficult, nearly impossible, to get the three-ply laminated stock most desirable for much of the work, owing to government use of these products. Most of the toys were made of scraps selected from the left-over bits kindly donated by one of the patrons of the school, the owner of a woodworking plant. Nearly every school has as patron one or more people connected with some such plant. By requesting that blocks, scraps of three-ply material and other usable kinds of wood be saved for school purposes, it is very likely that much can be obtained.

HISTORICAL STYLE AND THE DESIGNER

Edward J. Lake, Professor of Art, University of Illinois

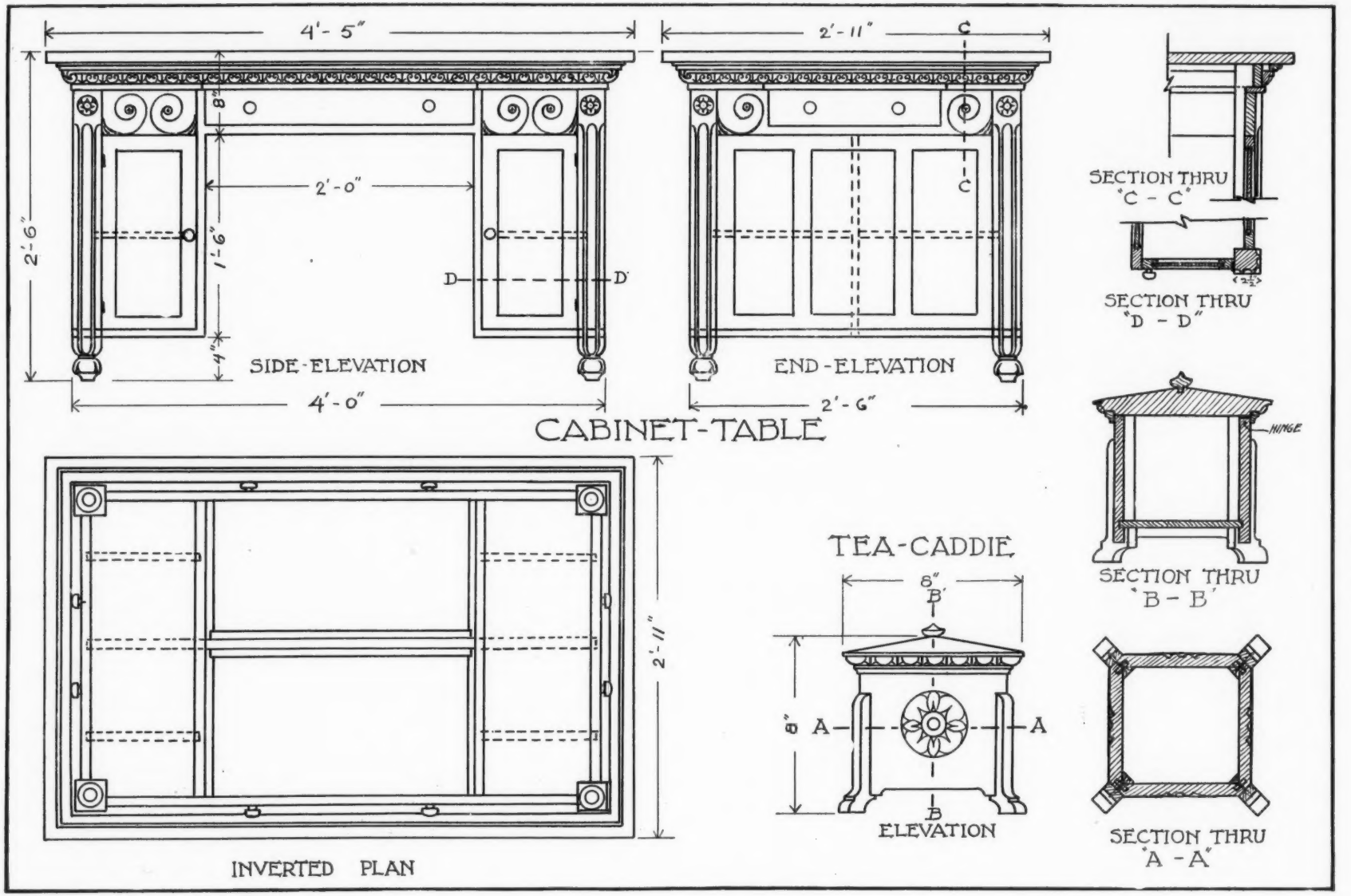
(Fourth Article)

THE Romans were the most pretentious builders of history. Their designs give impression of rich magnificence which is characteristic of a powerful and energetic people.

They were the first to use arches, vaults and domes in the construction of elaborate buildings, bridges, aqueducts and monuments. With the use of elaborate construction, there developed in Roman art, elaborate enrichment which in the best periods developed into a rich and splendid art. Of course enrichment should never weaken construction. Enrichment should be supported by evident construction. The leg of a table carved out of resemblance to a support for the table; the handle of a vessel that is made primarily decorative rather than useful; the parts of a design that are not organic with the whole structure are not consistent. Roman art offers some fine examples of enrichment that is well applied. The modern designer must learn to enrich consistently.

There is no virtue in mere plainness. Design in the manual arts as taught in our schools has avoided enrichment on the theory that the plainest design is the best. Fine proportion, form, texture and color are strong elements in design but every designer must learn to enrich his designs for that variety of expression which modern industry demands. Roman art offers a lesson in the application of enrichment to constructed forms.

The supports of Roman furniture and utensils set firmly on the ground. The rosettes, panels and brackets of Roman art are assertive and placed on axial parts of the design. The mouldings and offsets are pronounced and cast strong lines on the design which add to the vigor of the project. A sense of vigorous, pretentious design is expressed by Roman art and is a necessary expression for the modern designer to recognize and use.

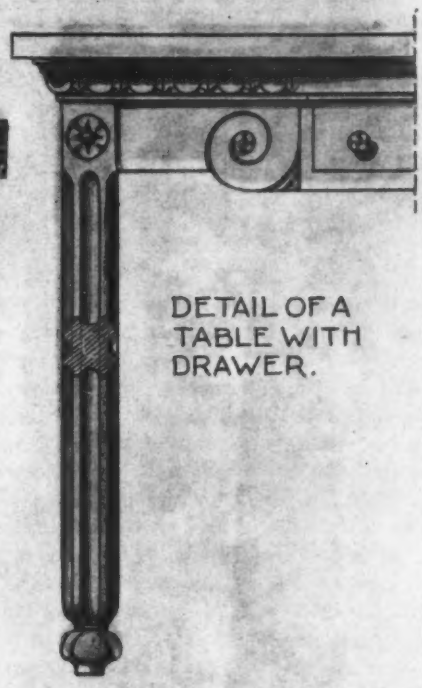


DETAILS OF ARTICLES IN THE ROMAN STYLE.

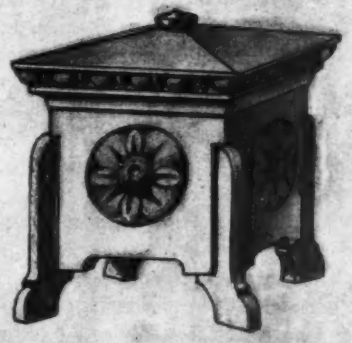
DESIGNS BASED ON THE ROMAN STYLE.

DISH-STAND

FLOOR-LAMP



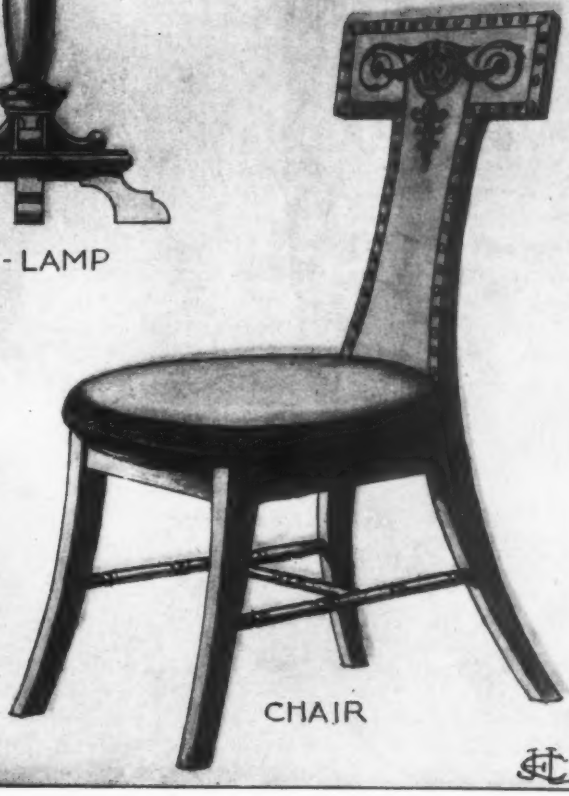
DETAIL OF A TABLE WITH DRAWER.



TEA-CADDIE

DISH-STAND

FOOT-STOOL



CHAIR

INDUSTRIAL-ARTS MAGAZINE

Board of Editors

E. J. LAKE S. J. VAUGHN

W. H. HENDERSON

EDITORIAL

ADMINISTRATIVE MACHINERY AND THE CLASSROOM.

WE shall be greatly surprised if the country does not demand a strict accounting by the vocational people for the money, time, and energy devoted in recent years to this work. The whole country has been flooded for a long time with literature and oratory on the needs and value of vocational education. National and state legislation has been enacted. Wonderful schemes have been put on paper. Numerous offices have been created and well paid directors, supervisors, and advisers have been employed.

In other words, an elaborate and complicated system has been devised, vast administrative machinery has been perfected, and great overhead expenses have been incurred. Now, some anxiety is being expressed as to when all this elaborate machinery may be expected to get into operation on a large scale in the actual work of the schools. Queries are already arising as to the possibility of early results in any measure comparable to the tremendous overhead outlay.

Let it be said once more that the value of systems, plans, talk, literature, and administrative paraphernalia must finally be judged by what actually takes place in the classroom. We have seen elaborate systems break down of their own weight. We have seen machinery so cumbersome and complicated and so illy directed that all the energy and motion were lost before the actual work for which it was designed had been accomplished.

The crying need now, as it has always been, is for skilled instruction and effective and wisely directed work on the part of the boys and girls in the classroom. All agencies concerned with vocational education should exert every possible energy toward getting the maximum amount of efficient classwork with a minimum amount of overhead expense and administrative machinery.

THE TEACHER READJUSTMENT.

THE rapid mustering out of great numbers of soldiers will inevitably cause many acute problems to arise. There is some danger that the effort to get back into suitable and remunerative positions may degenerate into an indiscriminate and undignified scramble.

It would be a pity, indeed, if the men who have conducted themselves so well under the stress of a national emergency should so far forget themselves as to act in a less dignified and generous way in matters of personal concern. We have complete confidence in the sincerity and high motive of the teachers who are or have been wearing the uniform. We expect the readjustment of the soldier-teachers in the school world to be made without untoward incidents, in spite of some rather uninspiring examples set in recent months by ambitious persons who could lay no claim to the consideration sometimes supposed to be due those who have been in the service. In fact, we expect the soldiers returning to peaceful occupations to live up fully to the standards set by civilians who stayed at home.

AN OPPORTUNITY AND A CHALLENGE.

IN previous years advancement along the line of educational or other endeavor has been hampered by the inertia of the public mind—the reluctance with which the public has let go of the usual and the customary and has grasped the new and the untried. Recent experiences, however, have been of such a character as to shake faith in tradition as a guide. The public mind has simply bounded from one thought revolution to another. It has become accustomed to the hitherto unthinkable marvels of science which the exigencies of war have revealed. It is now able to accept new conceptions of government, philosophy and ethics which a decade ago would have commanded little respect or tolerance.

In this opening of the public mind to new visions lies the hope of the modern education. And in the taking advantage of these changes in the public attitude lies the opportunity of the modern educator.

Now is the time to propose changes in the curricula. Now is the time to plead for a new type of education. Now is the time to fight retrenchment and to demand more and better facilities. Now is the time for teachers of vocational education to put forth every energy possible to reach the public with sane and convincing demonstration of the real merit of their work. This is no time for apology and lame excuse. The public is ready for readjustments and new policies. It's the vocational man's move.

EDUCATIONAL MISSIONS.

SINCE the war we have had two distinguished foreign missions sent to observe our educational institutions. England and France have each sent to this country a selected committee of educators to study our schools and to express the desire for cooperation in the development of affiliation between the leading nations for educational betterment. These missions have not been adequate in two particulars. In the first place they were composed of men who had reached distinction in special lines other than the education of the common people. There was no representative of common school training on either the English or the French mission. They were interested

primarily in advanced teaching and visited only the large universities.

In the second place they made such a hurried visit that little more than the physical equipment of our largest colleges could be observed by them. Of course this equipment was the most impressive feature of our schools to the foreign visitors who spent but a few hours at each of our large universities. A French delegate expressed the conviction that the Sorbonne of Paris could be housed in one building of any one of several American institutions. This is undoubtedly true. America has done her school business on a large scale. We are no doubt destined to see our schools grow in the next decade as they have in the past and reach proportions that will be even more ungainly, unless with that growth, attention is given to the better co-operation of the instructional forces.

We predict that not the least of this growth and co-operative development will come thru the demand for more and better training in industrial and vocational lines. With these demands comes the necessity of improvement and increase in three directions already hinted by various state organizations. First, more and better teachers. Second, an extension and enforcement of compulsory school attendance. Third, and certainly not of least importance, a clearer understanding of purpose and method in the instruction given. In each of these lines we have much to learn from the other leading nations. Let us hope that the American Educational Mission appointed to study foreign schools for the benefit of our own, will direct their observations to include the methods and results bearing on these three great needs in our common schools.

OCCUPATION AND CLASS.

WHEN objection is expressed to industrial and vocational instruction in the common schools it often finds expression in the statement "I am opposed to vocationalizing the common schools." When reasons for this opposition are given they often find expression in the statement "Industrial and vocational training in the schools will develop class distinction."

The first of these statments is based on the assumption that there is some contagious and contaminating influence in the pursuit of vocational efficiency that will not only be devoid of educational value but will replace academic study. The second statement is a surmise that the pupil who follows academic study exclusively will conceive that by such study he is of a distinct class and superior to the industrial and vocational pupil.

These assertions are made by those who have abounding faith in the academic routine of our schools, as they have been conducted and a deplorable misconception of industrial and vocational training as a necessity to the social welfare. We assert that there can be no possible danger of vocational study replacing academic study because they are interdependent. We further assert that no class distinction can be based on a selection of school work by pupils in this country of ours where the vocational citizen is not distinguishable from the professional, except in the city directory.

MORALE.

OUR vocabulary has been much enriched by war. "Morale" is one of those significant, meaningful words that have come to attention by war but may have application to affairs of peace as well. It has peculiar application to the school organization and no more significant question might be asked of a school official than "How is the morale of your school?"

Now we may suppose that some genius for organization will propose that a chair for the promotion of morale be established in the schools. Ah! Morale is a fine thing! We cannot get along without it. Let us find the George who can create and maintain morale and give him the job. Then we will be able to place the responsibility if he fails and share the credit if he succeeds. But alas! George is doomed to failure for morale in the school, like morale in the army, is a something that reflects purpose and conduct of each and every official, teacher and pupil. No one person can be held responsible for it. It can only be secured by the co-operation of all.

TWO IMPORTANT CONVENTIONS.

THE twelfth annual convention of the National Society for Vocational Education will be held at St. Louis, with headquarters at the Statler Hotel, on February 20-22. The advance program, copies of which may be had from the offices of the society, 140 West 42d St., New York City, proposes the following topics for discussion in the general meetings:

Rehabilitation of Wounded Soldiers.

Methods and Results of Industrial Training for War Workers in the War Industries.

Use of Vocational and Technical Schools for Training Army Mechanicians.

The States and the Smith-Hughes Act.

War-Time Participation of Women in Industry: Its Permanent Effects.

It is the purpose of this convention to evaluate in so far as possible the experiences growing out of the war that have a significant bearing upon vocational education and its future development in this country.

THE National Vocational Guidance Association announced a meeting to be held in St. Louis on the afternoon and evening of February 19. This conference precedes the meeting of the National Society for Vocational Education on February 20-22, and will be held at the same place as announced for the meetings of the National Society. It is intended that this meeting shall summarize the advances which have occurred in vocational guidance during the last few years.

SEVEN MILLION CANDIDATES FOR TRAINING

Charles T. Clayton, Director, United States Training Service

FOR want of adequate training, considerably more than 7,000,000 of the 10,000,000 workers in the manufacturing industries alone are equal to an average production of less than 35 per cent of what it could be and should be made without subjecting them either to high pressure or exploitation. Investigation into the relative efficiencies of employes of such industrial establishments indicate that of every four of them, three are producing at a rate less than the joint average output of the four, and that their general average is about 35 per cent of a normal day's output.

These workers need and want training, and the public as well as the employer should be interested in giving it to them. Indeed all three—worker, employer and public—ought to be in partnership in the enterprise of increasing industrial efficiency because the benefits redound to all. The employe will profit in the form of higher wages, steadier employment and greater opportunities, by training which improves his skill and productiveness. The employer will reap the advantage of larger output at lesser unit cost. The public (of which both worker and employer are a part) will be the gainer thru an increase in national efficiency and a better relationship between capital and labor.

Until the United States Training Service was organized, there was no public agency designed to meet the need of training the overwhelming majority of wage-earners already in industry—"on the payroll." There were, of course, industrial schools, apprenticeships and "continuation" classes, all doing excellent work. There were besides these some efforts at efficiency in direct connection with manufacturing processes. All these activities in behalf of training should continue, because within their respective scopes they are performing a very useful mission. But none of them, I think, can reach that great multitude of toilers who were compelled by economic forces to begin their labors without either cultural or industrial training, and who for the same reasons cannot afford to cease their employment to improve their skill.

There are 6,000 American manufacturers each employing groups of more than 250 persons, and facilities for part-time instruction are not yet available in one hundred of their factories. About half of the workers in American manufactories are employed in groups of 250 or more. In all, there are 300,000 employers having groups approximating 30 persons to the establishment. In a very large majority of these institutions, then, there cannot be adequate provisions for part-time training. Because of bodily and mental fatigue, obligations to family and duties of citizenship, all but a minority of industrial workers are unable, even if they are willing, to attend "continuation" classes.

It must be obvious in the light of these facts that the public's waiting for a satisfactory development of part-time and "continuation" training to insure the industrial conditioning of the "insufficient" three-fourths of American wage-earners, amounts practically to a deliberate denial of opportunity to nearly all of them. The purpose of promoting training by the industries themselves is to fill that gap in industrial education which for the present at least the admirable public methods are not prepared to close. The employer must become a party to the training of his workers and furnish the facilities for it in his establishment and in conjunction with actual production.

Vocational education will always have its valuable place and function, but it should be remembered that many who receive training will not adopt as a means of livelihood the trade or craft for which they were prepared. Thousands who begin their industrial careers in given occupations turn to other callings in the course of years. Labor is mobile not only as regards employment but also with respect to occupation. The average person in industry today is doing something wholly different than the work with which he began. A large number have successively adopted half a dozen different occupations. Take as a case in point the Secretary of Labor. The public is accustomed to think of him as a coal miner. He was a miner for many years, but he was a farmer first, and is yet a member of the Farmers' National Grange. Most readers of these lines will concede that they are now engaged in work which they did not in their youth intend or prepare to do. Vocational training would be an advantage to any industrial worker in so far as it afforded him cultural education, mental discipline and a knowledge of certain mechanical principles even if subsequently he drifted from the trade for which he was trained to another; but there would still remain the need of training him in his new occupation.

Faced by the facts that upwards of 7,000,000 wage-earners are in industry without sufficient training for their occupations; that they have the right and the desire to receive this training if it is of utility to them, and that they can best be taught in factories while engaged in production, the United States Training Service has set out to supply the want—and with some success. It is the plan of the United States Training Service to encourage and help manufacturers to institute training of their employes in conjunction with production, either on the factory floor or in a separate department where, however, the work they do while under instruction will be a part of the plant's productional processes and of its output. The instruction of workers, under this plan, may be en-

trusted to persons selected from the regular force or to special trainers, as conditions suggest.

By this method those operatives who are too good to "fire" and yet not really good enough to be retained, without improvement, in the organization, are put under the instructor for training until daily charts of their performances (which, of course, are obtained upon regular factory production) demonstrate an efficiency reaching the standard for the work on which they are engaged. Those of the next grade of inefficiency are trained in the same way and to the same end. The system is one of upgrading workers by extending their knowledge of processes and increasing their skill; it devotes itself to raising the average output of the three-fourths and not to speeding up the one-fourth whose rate of production is already satisfactory.

The effect of this method of training will best be illustrated by an example. A chart analyzing the output of a big eastern factory shows that of 26 men in one department six produced in two weeks of last October a normal result. The other twenty were far behind. For the 26 the average for 100 hours of work was 38 hours' output per capita. By training under competent instructors the average of the 26 will rise at least to 38 hours' output per capita. The average in the department will at the same time go to 46 hours. As a net result the low men will have brought up their average 35 per cent, and the general average output will have been increased by 20 per cent. As a matter of fact that is exactly what was accomplished in that department, and training is continuing to bring the average still higher.

The experts of the United States Training Service begin with a careful and analytic survey of the operations of a given plant to determine the actual conditions governing production—the rate and the cause of labor turn-over, the explanation of delays and stoppages, the kind and degree of failure in machines, equipment and repairs and in the supply of materials—and to ascertain the opportunities for reorganizing routine, machinery or processes. The employer himself is put thru a course of training, so to speak, to disclose and correct the shortcomings of management, which, by the way, are usually responsible for 90 per cent of labor turn-over and other like obstacles to production. With this definite information to demonstrate the need and advantage of training, the expert will be prepared to advise the form it should take; that is whether in a separate department or on the floor thru an upgrading process; and to recommend the methods best adapted for sound instruction.

At the instance of the United States Training Service, two hundred large concerns have instituted the sort of training I have outlined. Within a month 27 big corporations have begun to train their employes under this system. Two of these have an aggregate of about 30,000 employes in 22 plants. The Training Service now has requests from a number of manufacturers who want preliminary surveys of their plants with a view of introducing training. The concerns which have adopted training along the lines I have indicated in the foregoing paragraphs have reported either that it is a profitable investment or that it has become an "asset" by offsetting in one way or another the cost of its operation. Many of these employers installed training as a "necessity of war," but are now continuing it as one of the permanent, indispensable economies of their peace-time production.

Far from disparaging the various types of vocational education which are being encouraged to assist industry, I commend and welcome them. It must be obvious, however, that some other and additional means must be provided for the training of the 7,000,000 workers who must earn while they learn. It is not physically possible to bring these, en masse, to training—so training must be taken to them. The factory must be their school; their lessons must be their regular tasks which, however, they must be taught to perform so as to extend their knowledge of processes and to develop their skill; in short, they must be instructed and enabled to do by doing, to

MR. RUSSELL C. LOWELL,
Director of Vocational Education, Indianapolis, Ind.

Mr. Lowell, who assumed direction of the vocational education activities of the Indianapolis schools on January first, is a New Englander by birth and education. He has had wide experience both educational and industrial, which fits him especially to organize the industrial education activities in a general manufacturing city like Indianapolis. He is a graduate of Brown University with an M. E. degree and has done graduate work in education and school administration at Brown and Harvard, (M. A. in 1907). He holds a certificate for a superintendency of schools in Massachusetts and a life teaching certificate in Rhode Island.

Mr. Lowell's teaching experience includes work in Massachusetts and Rhode Island. He organized and conducted part-time classes for machinists in Providence. He has had practical experience as a machinist, tool maker, electrician and printer, and has acted as consulting engineer.

In February, 1918, Mr. Lowell was summoned to Washington to act as a specialist for the Federal Board of Vocational Education. As such he acted successively as assistant superintendent of training, office manager and district officer and spent some time in the rehabilitation section.

make their work a medium for their improvement as well as a means of livelihood. Whatever the explanation may be, the fact is that millions of our youth enter industry every year not only without industrial training but also without even the rudiments of cultural education. If, under economic pressure, or whatever the exigency may be, these cannot be detained in school long enough to procure the fundaementals of general education, how can they be kept there for vocational training? It strikes me that they must be followed into industry, as it were, and there be trained to higher usefulness. If this is undertaken, then the training given to them should be and must be in the factory, on actual production, and at the expense of the industry, but under the supervision of the government.

The experience with training during the war demonstrated the advantage of this arrangement. The United States Training Service is engaged in instituting that same sort of training now under conditions of peace and in behalf of manufacturers who want to minimize the cost of production while enhancing output, and also for the benefit of workers who need and wish and have the right to be better fitted for their places in industry. The Department of Labor, with a jurisdiction and an organization extending thruout the country, is best equipped, to my mind, to establish this training and to administer the small amount of public money which is devoted to it.

There is not only no conflict between this form of training and vocational education, but they are in fact complements one of the other. Wherever classroom instruction can be organized in part-time or evening schools, the United States Training Service is using every effort to promote its installation. Vocational training as a preparation for those who intend to enter industry will have the same support from this service. The purpose and function of the United States Training Service, however, is to deal with the gradation, the extension of knowledge and improvement in craftsmanship of employes by direct instruction in industrial processes carried on at the expense and by the industries affected. This is a distinct field of activity and one in which there had been practically no thoro, comprehensive effort to introduce industrial training until the war showed the need and compelled provision to meet it.

The United States Training Service now has in the field eighteen superintendents of training. They are at work in the big industrial centers between the Atlantic Coast and the Mississippi River. Their advice and services, recommendations, and the assisting in the task of instituting and conducting training, are given free of cost to manufacturers. The Washington office of the Training Service is also prepared to act as a clearing house for information and technical advice that will be helpful to those who desire to study accomplishments of training already in operation, and to provide competent instructors.

VOCATIONAL WORK IN THE WASHINGTON STATE SCHOOLS.

At the last session of the Washington legislature an appropriation of $12,000 for the two-year period of 1918-19 was made in order that the state might take advantage of the federal appropriation which for the same period amounts to $21,887.42. This will start the appropriation income for the state for the biennium of 1919-21 and will give for teacher-training, $23,677.30; for agriculture, $24,459; for vocational home making, $6,442.97; trades and industries in part-time schools, $15,033.64; a total for the period of $80,351.42.

In the ten-year period from 1917 to 1926 there will be available for teacher-training $113,402.67; for agriculture in the schools, $187,520.61; for vocational home making, $49,-396; for trades and industries in part-time schools, $72,294.65; and trades and industries in day and evening schools, $115,291, a total of $537,905.18.

The vocational work of the state is just now in an incipient stage. The Federal Board of Vocational Education appointed the State Board of Education as the State Board of Vocational Education. Later the offices of director of vocational education, supervisor of agriculture and head of the teachers' training course in trades and industry were created. The work of the board is now under way but with the growing needs for teaching the trades and industries during the past few months much has been accomplished, especially in the direction of evening classes for shipworkers at Bellingham, Seattle and Tacoma, during which time there was a total enrollment of 21,146.

Eleven schools have established standardized courses in vocational agriculture. The Y. M. C. A. and the Seattle School of Engineering have co-operated in the establishment of classes in radio buzzer and mechanical trades. In the cities of Seattle, Everett, Bellingham, Spokane, Tacoma and Snohomish trades and industry classes have been established, as well as at the elementary school of science at Pullman, with instruction in such subjects as carpentry, gas engine work, electrical construction, foundry work, machine shop work and mechanic arts. Schools of agriculture have been established at Mount Vernon, Clarkston, Colville, Enumclaw, Grandview, and in the Meridian Union High School near Bellingham, and at Snohomish, Tekoa, Walla Walla, Wapato, and Yakima.

Vocational home making classes have been established at Spokane and in the Broadway High School at Seattle. All classes are watched by the state director and his assistants as a basis for applying for statewide application of funds for this purpose in course of time and for the appointment of a supervisor for the work.

One problem which has faced the vocational director has been that of teachers of trade subjects. Many of the experienced workers will not leave their work to go to the university where they might take a training course. This has made it necessary to establish evening courses for teachers who are working during the day. The men are selected after careful observation and examinations by the supervisor of teacher training and they are given the courses free, with recommendations for positions as soon as they have qualified. Seattle has a number of such men taking evening courses and both Spokane and Tacoma plan to start groups during the present winter.

A class of work which is contemplated under the vocational law is the establishment of evening schools in mining, lumber and logging, and railroad camps. Altho the act contemplated only the teaching of courses to meet the federal law and the civic demand, it is planned to establish evening courses supplementary to the day's employment so that these additional courses may be subsidized and the teaching of history, English, economics and the fundamentals of industrial education may be acquired.

The vocational director points out that it is not intended that young people shall be drawn away from a general education prematurely but that they shall be given the opportunity of industrial training as they are about to enter an industry or after they have already entered upon their work.

The policy of the board in laying emphasis on the day unit trade courses has resulted in more schools becoming standardized and meeting the requirements of the federal act.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Readers are invited to submit successful problems and projects. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A ROCKER.

H. E. Boggy, Paola, Kans.

Even tho the present day tendency is to get away from straight-line furniture, we are compelled to use that style in the school to a great extent from a practical standpoint. The design here given contains enough of the curves to give a very pleasing result.

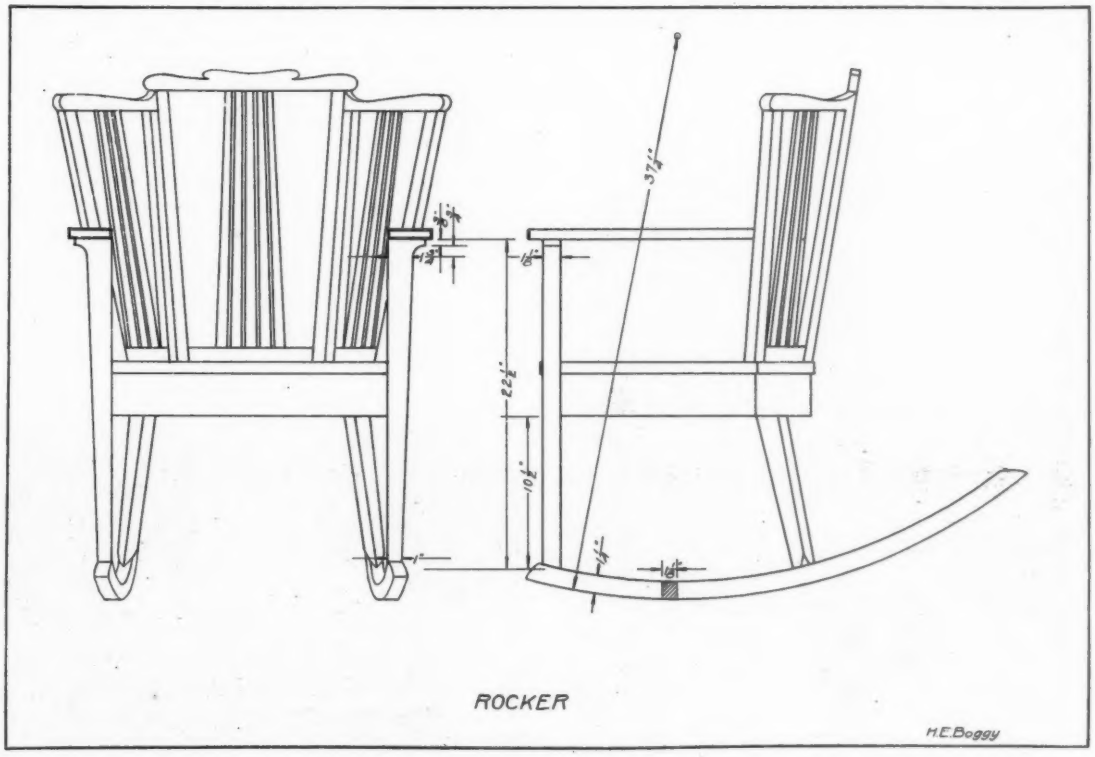
Walnut was used for the rocker, but mahogany, or, perhaps, a fine grained oak would do as well.

The two front legs and 2¾″ base for the bottom are the first to be assembled, followed in order by the top of seat, back and arms. The top of the seat ought to have two dowels in each mitre joint. It is fastened down with screws thru the braces from below. The back, after being assembled in three parts, is fastened with countersunk screws thru the parts which come together. The screw head should then be filled with putty to match in color with the wood, or, glue and very fine sawdust of the kind of wood used. The small end of the arm is screwed to the back and the screw head covered over in like manner. The front end of the arm ought to be rounded back on each arris ⅛″ instead of being chamfered.

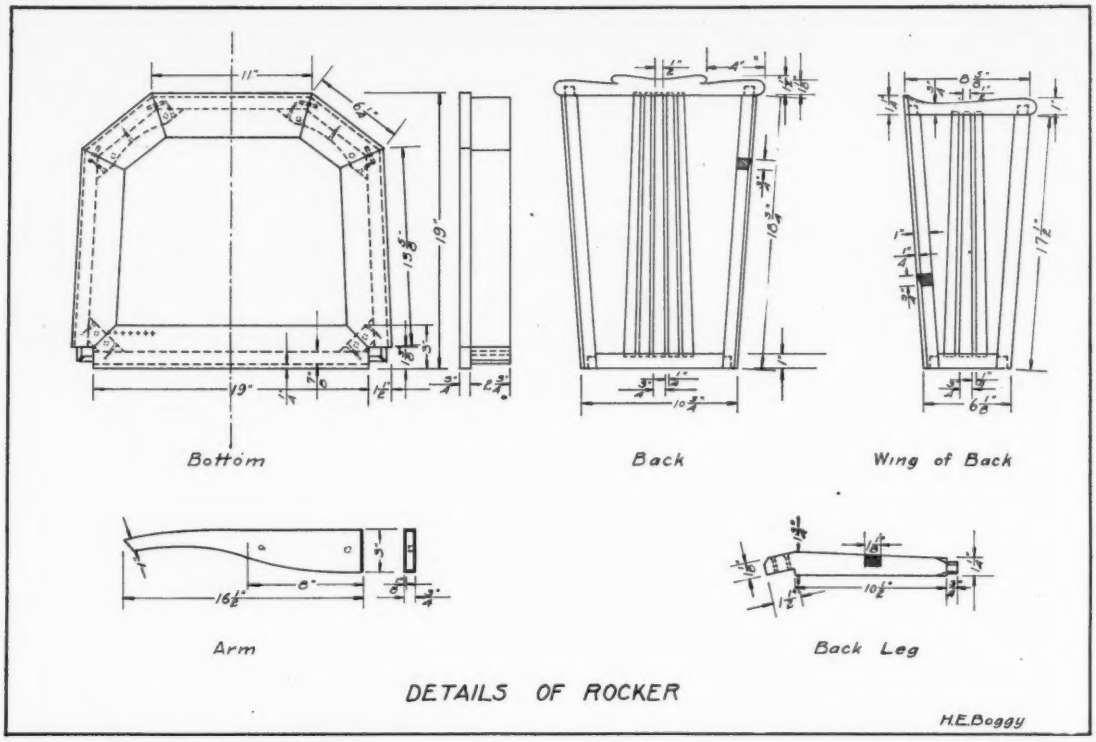
By using the grade of fine-fine cane for the chair bottom, the fine lines of the design continue to be carried out.

For a finish, the wood was filled with a regular paste wood filler, to which was added a little Vandyke brown and burnt umber and a pinch of lamp-black (the more lamp-black, the darker will be the color of the wood). A coat or two of wax, well applied over the filler, gives a very pleasing result.

The Completed Rocker.



DETAILS OF ROCKER



A WASTE BASKET.

J. I. Sowers, Vincennes, Ind.

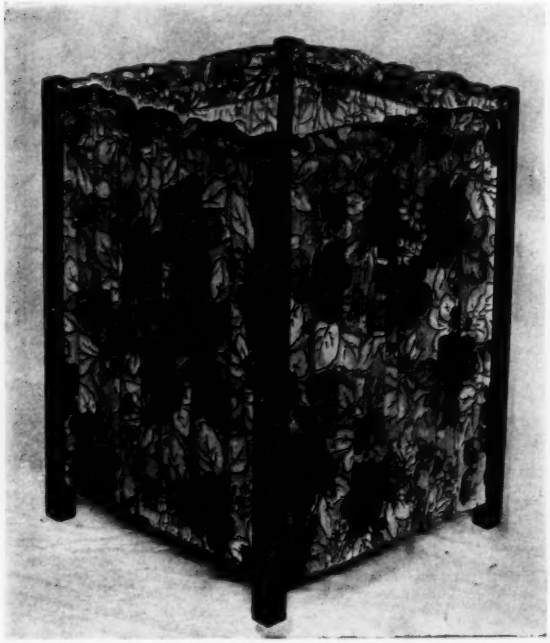
This problem is especially good for use early in sixth grade woodworking. It is valuable in teaching the squaring of stock and brings into use the plane, saw, boring tools, and the try square.

The uprights are ⅞″ stock, dressed and finished to 16″ by ¾″ square. The sides are formed from eight 7-16″ dowels each 11″ long, upon which the cloth forming the sides and bottom are stretched. Baskets of this type may vary greatly in size, but we have found a heighth of 16″ and an overall width of 11½″ a very good size. Gum has been found excellent stock for the uprights, as it is easily handled by grade boys.

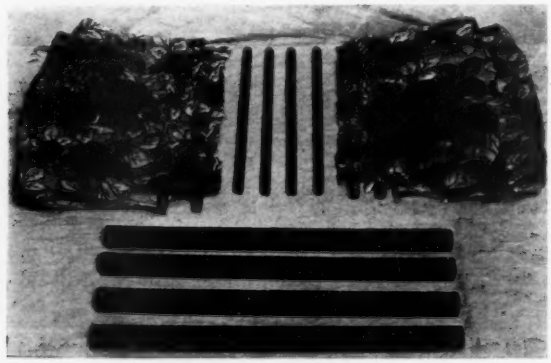
The cloth sides consist of 1½ yards of cretonne, cut and sewed 14″ wide by 44″ long and were made by girls in the sewing classes. In the basket illustrated a cheap cretonne, in brown and orange, was used to harmonize with the reddish brown of the gum. The boys are encouraged to select colors which will harmonize with the decorations of the room in which the basket is to be used.

The basket has proven popular at Christmas sales and a quantity was ordered by one of the Vincennes department stores.

To assemble the basket put the four lower dowels in first (at bottom) and shove the four uprights firmly together. The upper dowels should be put in position in the pieces of cloth. Having the bottom dowels in position, take up either piece of cloth (they are both the same length) and with dowels in position in the ends of the cloth, draw the cloth under the two *highest* dowels at the bottom. In this way it comes across the bottom, then bring the cloth up the sides and shove the two dowels in position at the top, forming in this way the



The Basket Set Up.



Parts of Waste Basket.

bottom and two sides of the basket. Now take the remaining piece of cloth, with dowels in position at ends of cloth, and run it under the two remaining dowels at bottom (it will be the two *lowest* dowels this time), thus forming two bottoms across opposite ways. Now bring up the sides as before and shove the dowels in position at top. The cloth is made a little *short*, so as to stretch tightly. After basket is all together gather cloth equally upon the dowels, thus giving a nicely gathered effect at top. In first putting the uprights together care must be taken to get the proper pairs together.

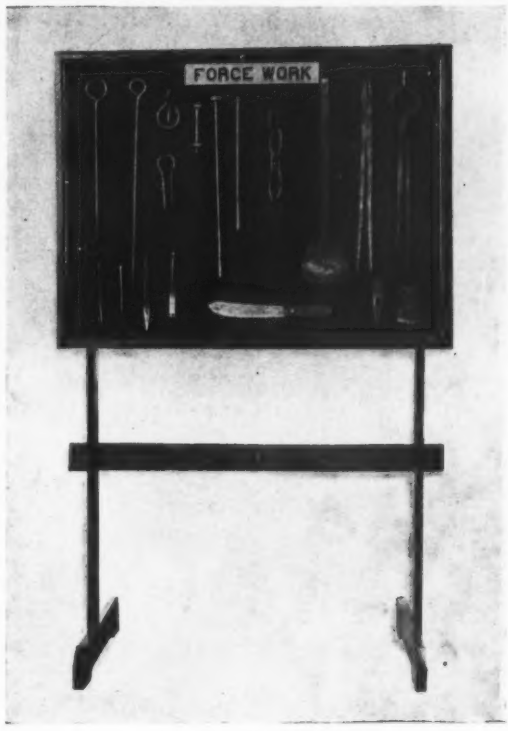
AN EXHIBITION BOARD.

Ralph F. Windoes, Davenport, Ia.

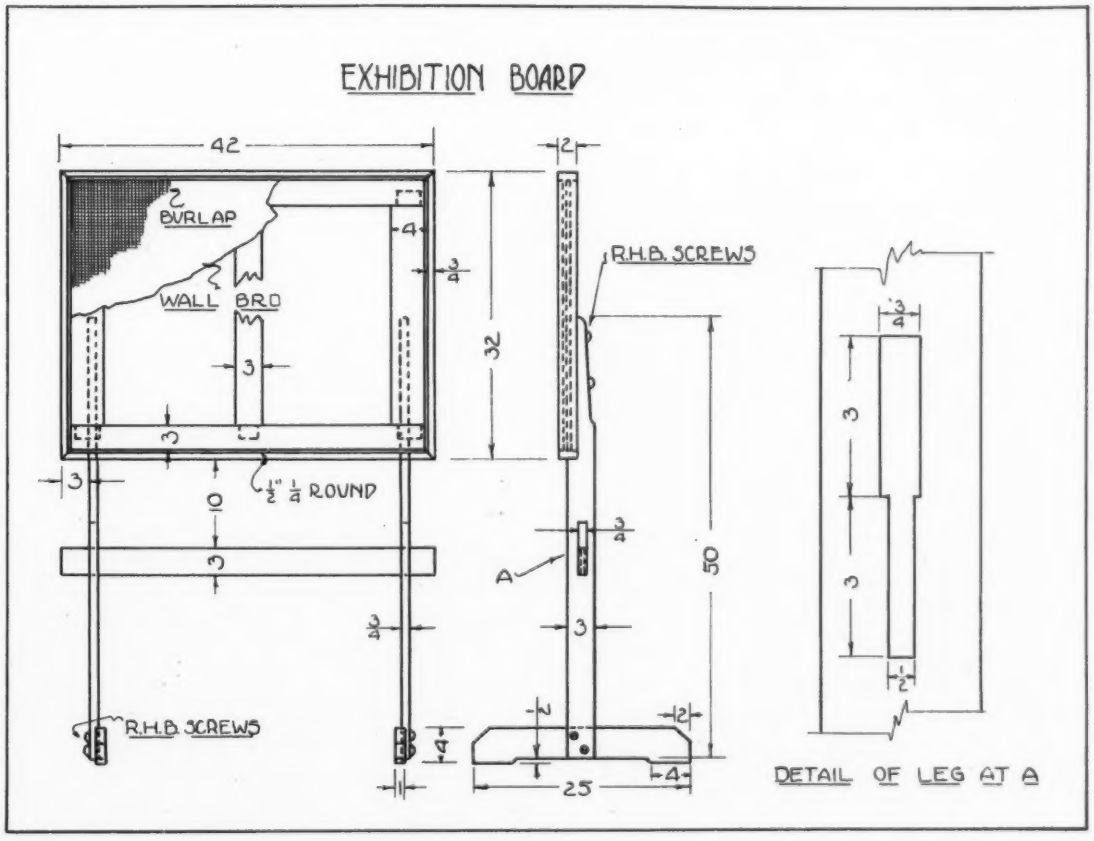
The exhibition board illustrated was designed by Mr. Newton Van Dalsem, and is the type used in the Davenport schools. It is a "take-down" proposition. The cross rail lifts up for removal, and four round head screws complete the demounting. It then occupies small space and can be easily packed for shipment.

The board upon which the exhibit is fastened is backed by a softwood frame of ¾" stock. This is fastened with nails thru the sides. Over this is mounted a panel of wall board, covered with burlap. "Comp-board" with the wood core is better for this backing than the ordinary fibre board. One-half inch quarter-round moulding covers the tack heads in the burlap. The center rail is held in place without fastenings of any kind. Each end has a groove routed on opposite sides so that the wood left between the cuts is ¾" thick. The leg is mortised as shown in the detail and this rail slipped thru the large end of the mortise. Then the rail is pushed down, effectively locking it in the ¾" spaces. This must be done before the legs are screwed onto the back.

The board illustrated was made of oak, finished golden, with green burlap. A permanent exhibit is kept on these boards, about ten of them being in use at this time. The name of the city is stenciled across the bottom rail, which is convenient if the boards are taken to another city for exhibition.



The Board in Use.



DETAILS OF EXHIBITION BOARD.

A DOUBLE WORKBENCH FOR THE COUNTRY SCHOOL.

Louis M. Roehl, Director of Farm Shop Work, Cornell University, Ithaca, N. Y.

A demand for a woodworking bench, at which a number of boys can work, caused the bench illustrated and described here to be designed and built. The bench has been made and used successfully in a number of small rural high schools where space and funds will not allow the purchase and use of the familiar individual type of bench.

Bills of Materials and Instructions for Making Double Workbench.

Bench Stop—Bill of Material.

Pieces	*Dimensions*	*Use*	*Material*
1	¾″x1″x8″	Left side	Soft wood
1	¾″x4½″x8″	Wedge	Soft wood
1	¾″x4″x8″	Right side	Soft wood

5 flat head, bright wood screws 1½″ No. 8 or 9.

Vise—Bill of Material.

Pieces	*Dimensions*	*Use*	*Material*
1	1¼″x7½″x24″	Jaw	Oak, maple or hard pine
2	13/16″x2″x17″	Horizontal brace	Oak or maple
2	13/16″x2″x2′ 7½″	Diagonal brace	Oak or maple

1 iron bench screw ⅜″, 1′ or 1½″.

4 flat head, bright wood screws 1½″, No. 12, for fastening vise to jaw.

8 flat head, bright wood screws 2″, No. 12, for fastening braces to jaw.

8 flat head, bright wood screws ¾″, No. 8, for fastening braces at joint.

SIX VISE, HOME-MADE DOUBLE WORKBENCH.

Bill of Material.

Pieces	*Dimensions*	*Use*	*Material*
4	1¼″x10″x16′ 0″	Top	Hard pine
8	1¼″x5¼″x2′ 7″	Legs	Soft pine
4	1¼″x5¼″x3′ 2¾″	Sills	Soft pine
2	13/16″x4″x3′ 2¾″	End cross braces bottom	Soft pine
2	13/16″x4″x2′ 10¾″	Cross braces at bottom	Soft pine
2	13/16″x4″x 4′ 11 3/16″	Middle horizontal braces at bottom	Soft pine
2	13/16″x4″x5′ 1¾″	Horizontal braces at bottom	Soft pine
2	13/16″x11″x16′ 0″	Aprons	

32 carriage bolts ⅜″x7″ with washers for bolting top to sills.

16 carriage bolts ⅜″x6½″ with washers for bolting sills to legs.

4½ dozen flat head, bright wood screws 1½″, No. 8 or 9, for fastening braces and aprons to legs.

16 8d finishing nails for toenailing the two middle cross braces to the legs.

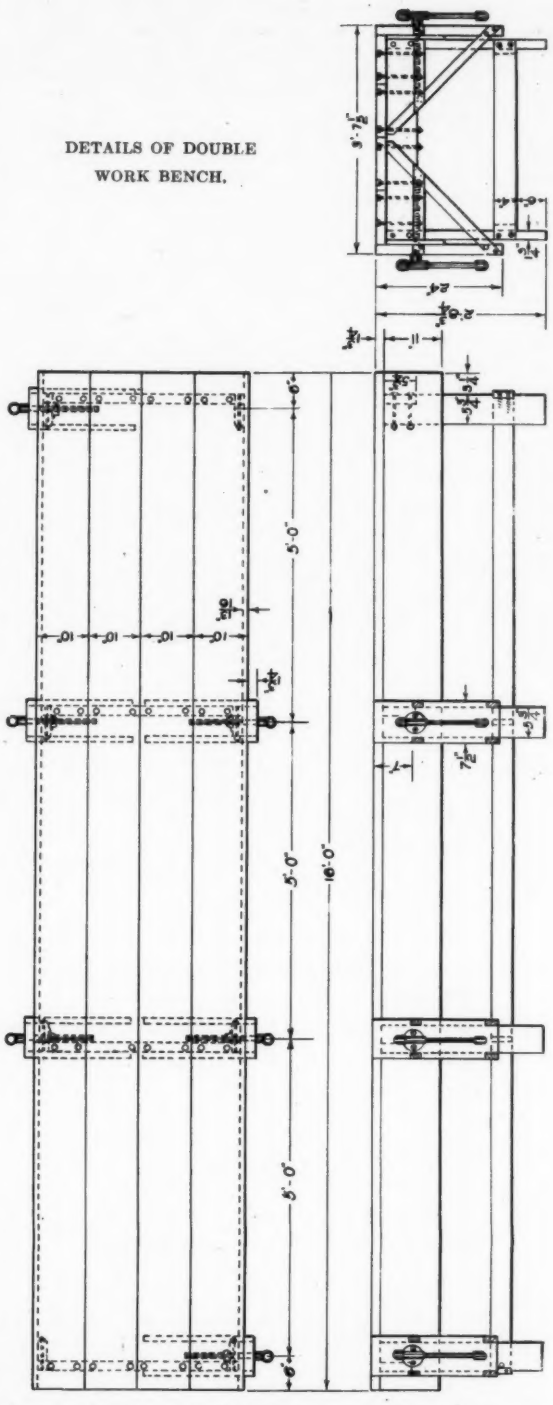
All lumber for the bench should be thoroly dry. The top can best be made of hard pine planks which should be planed on both sides and jointed. If they are gotten out at a mill it is well to have them dressed to exactly ten inches in width and matched at the mill so that they will draw up to tight joints and make a top of exactly forty inches.

Pieces narrower than ten inches cannot be used for the top of a double bench where this kind of vise is used as the upper ends of the horizontal braces interfere with each other. It may be noted in the illustration that the points have been sawed off so as to prevent interference when opposite vises are closed at the same time.

1. Cut the eight legs to exactly the same length, 2′ 7″, and lay out the mortises 1¼″x5¼″ on one edge at one end of each piece and cut the mortises with the cross-cut saw and rip saw. (Do not split out the wood for the mortise.)

2. Cut the four sills to exactly the same length, 3′ 2¾″, and fasten to the legs with two ⅜″x6½″ carriage bolts at each joint. It is well to measure the exact width of the four planks and the thickness of the two aprons and regulate the length of the sills accordingly. Any deviation from the widths called for in the drawing must be corrected here.

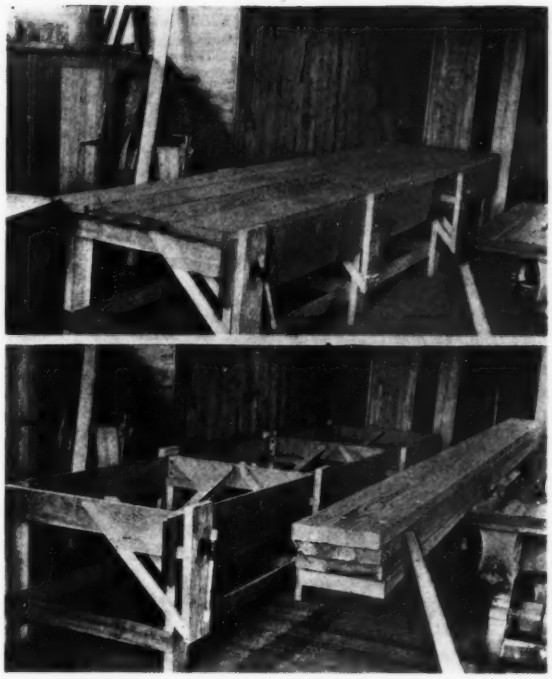
3. Measure and cut the two lower end cross braces to the same length as the sills, 3′ 2¾″, and fasten with two 1½″ No. 8 or 9 flat head wood screws at each end of each piece.



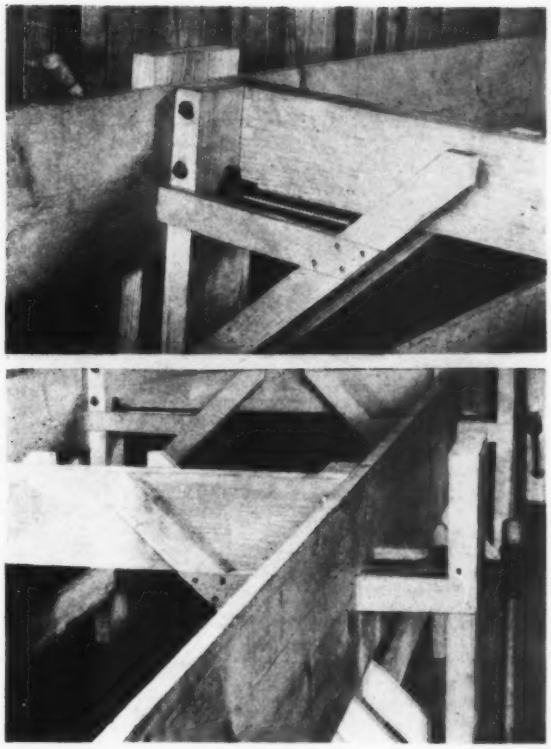
DETAILS OF DOUBLE WORK BENCH.

4. Measure and cut the horizontal braces to the lengths called for in the above bills of material and fasten to the legs with three 1½″ No. 8 or 9 flat head wood screws at each end of each piece. The two middle lower cross braces should be cut to their length, 4′ 11 3/16″, and placed in position at the same time as the lower horizontal braces as they butt against the legs between the horizontal braces. They should be fastened by toenailing with two 8d finishing nails from each side.

5. Fasten the aprons in the position with three 1½″



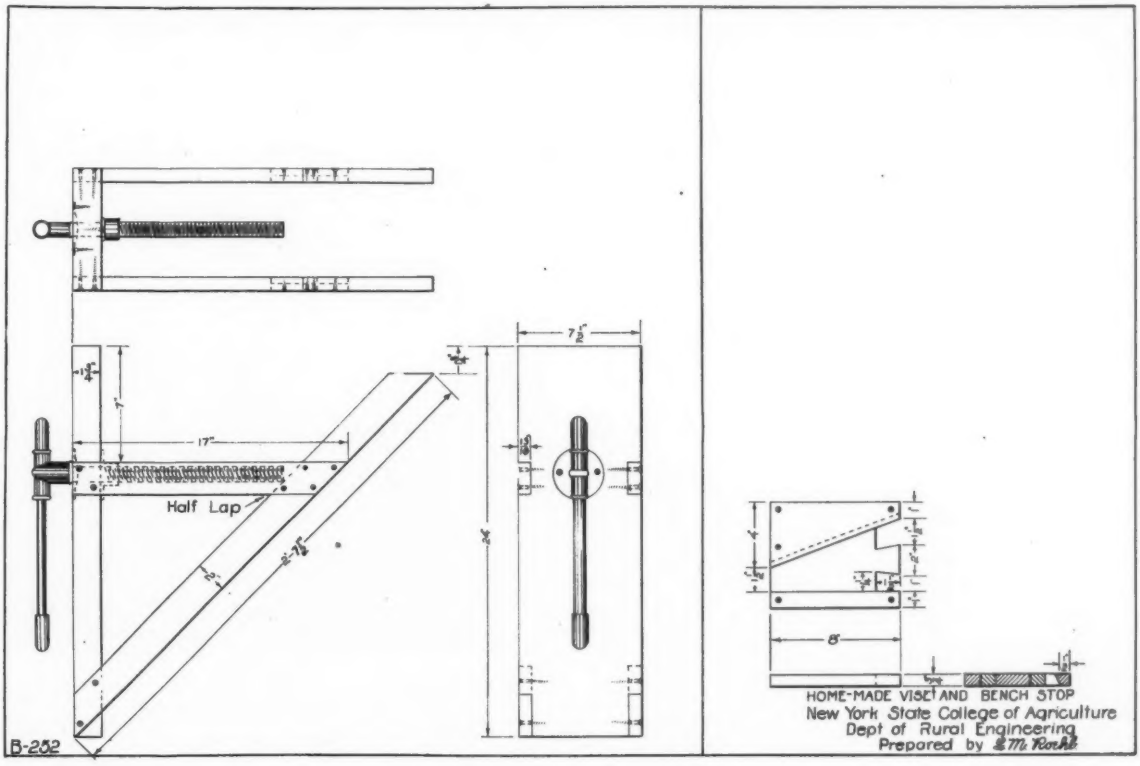
(Above) Work Bench complete. (Below) Framing of Bench.



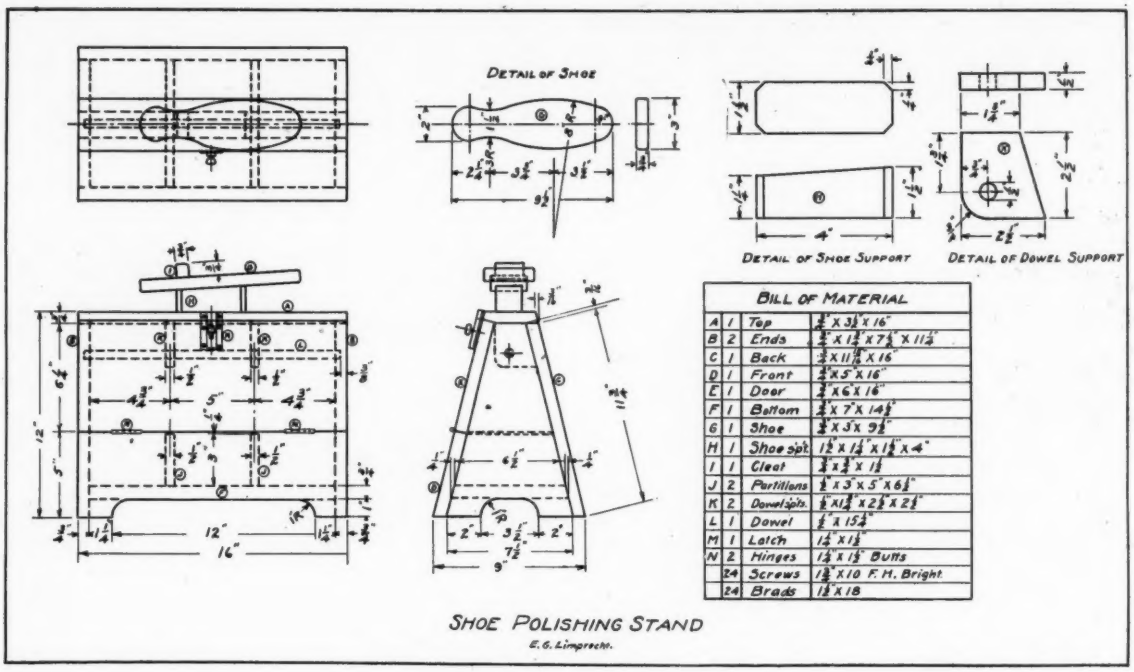
(Above) Inside View of Vise. (Below) Outside View of Vise.

No. 8 or 9 flat head wood screws. Avoid placing a screw in the center where it will interfere with the bench screw.

6. Lay out the mortises in the apron for the horizontal braces of the vise so that the top of the mortises are 7″ from the top of the bench or 5¼″ from the top of the apron and so that the inside of the mortises falls flush with the sides of the legs. The mortises should be made slightly larger than the braces so that the braces will work thru them freely.



DETAILS OF VISE AND BENCH STOP.


DETAIL OF SHOE
DETAIL OF SHOE SUPPORT
DETAIL OF DOWEL SUPPORT
BILL OF MATERIAL
A 1 Top 1/2" X 3 1/2" X 16"
B 2 Ends 1/2" X 1 1/2" X 7 1/2" X 11 1/2"
C 1 Back 1/2" X 11 15/16" X 16"
D 1 Front 1/2" X 5" X 16"
E 1 Door 1/2" X 6" X 16"
F 1 Bottom 1/2" X 7" X 14 1/2"
G 1 Shoe 1/2" X 3" X 9 1/2"
H 1 Shoe spt. 1 1/2" X 1 1/2" X 1 1/2" X 4"
I 1 Cleat 1/2" X 1 1/2" X 11"
J 2 Partitions 1/2" X 3" X 5" X 6 1/2"
K 2 Dowel spts. 1/2" X 1 1/2" X 2 1/2" X 2 1/2"
L 1 Dowel 1/2" X 15 1/4"
M 1 Latch 1 1/2" X 1 1/2"
N 2 Hinges 1 1/2" X 1 1/2" Butts
24 Screws 1 1/2" X 10 F. H. Bright
24 Brads 1" X 18
SHOE POLISHING STAND
E. G. Limprecht.

DETAILS OF SHOE POLISHING STAND.

7. Locate and bore a hole for the bench screws with a bit 1/16" larger than the bench screw thru the aprons and legs on a center line of the leg 7½" from the top of the bench, or 5¾" from the top of the apron.

8. Place the bench screw thru the hole and fasten the screw washer in place on the inside of the leg with two 1¼" No. 12 flat head wood screws.

9. The braces for the vise are assembled at the half-lap joint and placed thru the apron from the inside and fastened to the jaw of the vise with two 2" No. 12 flat head wood screws at each brace.

10. Lay the top planks in place, clamp tightly, and draw lines across over the center of the cross sills.

11. Locate points on lines just drawn 1½" from each edge of each plank excepting the outside edge of the outside planks which are 3¼".

12. Bore holes ¾" deep on points just located with ⅞" bit.

13. Continue holes thru planks and into sills with ⅜"bit.

14. Remove planks and continue holes thru sills.

15. Place planks in position and fasten with bolts, using one washer for each bolt.

16. Plug the holes in the top of the bench.

A HANDY SHOE POLISHING STAND.

E. G. Limprecht, Instructor in Drawing and Machine Design, West Virginia University, Morgantown, W. Va.

Altho the "Shoe Polishing Stand" has been a very common project in the manual training shop, its usefulness cannot be denied.

The one shown in the accompanying sketch is believed to be different from most of those already tried.

The special feature of this design consists of the sloping sides, which prevent striking the knuckles against the corners when polishing with a rag on the double hand stroke.

Any of the cheaper woods ordinarily found in the shop may be used in constructing this project.

As shown in the sketch the lower portion is divided into three compartments, or as many as may be wanted to hold the different kinds of polish used. A one-half inch wood dowel runs lengthwise thru the upper portion, supported as shown, dividing it into sections. Each section intended is to hold the rags corresponding to the polish in the compartment beneath. This avoids the delay and inconvenience of sorting the materials which are usually jumbled together in one box and prevents using the same polishing rag with different colored polishes, a thing which is disastrous to nicely kept shoes.

The drawings are sufficiently detailed so that further description of the parts is unnecessary.

PRODUCTS OF AN EVENING CLASS OF GRADE BOYS.

The chairs in cut I were recaned and the toys in cut II were made in an evening class organized by Principal Godfrey Messer of the Washington School, Waterloo, Ia. The purpose of the class is to provide useful activities and to keep the boys off the streets.

THE MANUAL ARTS CONFERENCE AT THE STATE NORMAL SCHOOL, TERRE HAUTE, INDIANA.

A conference of men in charge of training courses for teachers of manual arts and vocational work was called by the Commissioner of Education at Terre Haute, Indiana, on Thursday, Friday and Saturday, December 5, 6, and 7. The invitation was extended to men in the different states of the Mississippi Valley and about 25 delegates attended the conference. The conference was the ninth annual conference of the directors of special training courses and the fifth since such conferences have been held under the direction of the Federal Bureau of Education.

The meetings opened at the Hotel Deming in Terre Haute, at 10:00 o'clock, Thursday morning, with an opening address by Mr. U. O. Cox of the Terre Haute State Normal School. Mr. Cox interpreted vocational education in its relation to other forms of education and welcomed the conference to Terre Haute.

He was followed by Professor F. S. Bogardus, of Terre Haute, who spoke on the war aims courses in the vocational sections of the S. A. T. C., showing how cultural and humanistic aims have resulted in a large measure from the war aims courses. He felt that this background of information was of great value to men taking the work, and felt that in a similar way subsidiary courses in manual arts and vocational education should show a larger outlook in those fields. Such work as the study of industries, serving to explain their present significance, was mentioned as a type.

On Thursday afternoon, Mr. A. F. Siepert of Bradley Institute, Peoria, Illinois, submitted a "progress report" of the conference committee on practice teaching. This committee felt that one difference between manual arts and vocational education was that of degree rather than kind when both are up to standard. A discussion following this interpretation showed that the members of the conference all felt that some of the manual arts work had a distinct vocational value. The committee felt that while the mastery of a process is necessary for shop teachers, such ability may be gained in part in the school shop or entirely in the machine shop. It was recommended that appropriate tests for the measurement of standards of workmanship for shop teachers be devised. Teacher training institutions were advised to ascertain student's ability to round out weak spots in his theory and practice and to give skill in teaching along with the opportunities of teaching. It was shown that lesson plans should distinguish clearly between the content of a lesson and the method of teaching it. The need for opportunity for student teachers to observe expert teaching in order to form suitable teaching standards was stressed.

Mr. K. G. Smith, Regional Director of the Federal Board for Vocational Education, Indianapolis, presented a very suggestive chart on "What We Need in the Shop Teacher and in the Related Subjects Teacher." He pointed out that the raw material for shop teachers is the skilled tradesman with well developed manual skill and trade intelligence or shop sense, and a fair degree of technical knowledge. He showed that the source of this supply includes shop trained men, technical graduates with shop training, and trade school graduates with shop training. He advised a program for an evening extension course for teachers to include: Trade analysis and organization of teaching material, teaching methods and instructional management, and a study of such related subjects as trade mathematics, trade drawing and trade science. These teachers would be available as instructional foremen in plants or as shop class teachers for day and evening schools. Mr. Smith developed in a similar way the raw material and type of training for the "related subjects" teacher. After the presentation Mr. Smith answered a number of questions regarding the details of his recommendations.

On Friday morning, in the Industrial Arts Building of the State Normal School, Dr. W. T. Bawden of the United States Bureau of Education explained a report that had been prepared by a group of specialists in science and industrial arts called by the Commissioner of Education for a conference in Washington last May. While the war emergency situation has changed it was felt by all that the kind of study undertaken and some of the recommendations made were of such a character that the work should be given further attention. The report was issued by the Bureau of Education in September, 1918, as "Secondary School Circular Number 4—Industrial Arts in Secondary Schools in the War Emergency." It suggested an emphasis upon definite shop training in high schools during the next few years. Doctor Bawden indicated that many suggestions have been sent to the Bureau of Education as to ways in which different communities in the United States could be stimulated to try out some of the recommendations of the conference.

Luncheon was served to members of the conference by members of the Household Arts Department of the Normal School, furnishing an agreeable opportunity for many informal discussions of the deliberations of the conference.

In the afternoon the committee on examination and certification of teachers, thru its chairman, Mr. A. B. Mays of the Sam Houston Normal Institute of Huntsville, Texas, presented its report and recommendations. The report indicated a large variation among the states as to requirements in the certification of special teachers such as: Of 39 states replying to a questionnaire, 72 per cent do not require special teachers to have regular teacher's certificate, 15 per cent do require the regular certificate, and 13 per cent require either the regular or the special. Of 43 states replying, 70 per cent require special certificates, 18 per cent do not require special certificates, and 12 per cent require regular or special. A few states make such requirements as: previous teaching experience, trade experience, or from two to four years of college work. Where the teaching is to be trade school teaching a few states make a different type of requirement for certification. The committee noted a great need for the formulation of some principles which should govern the examination and certification of special teachers.

A talk was given on some lessons from the army training schools by Mr. R. W. Selvidge from the George Peabody College for Teachers, Nashville, Tennessee, and District Educational Director of the Committee on Education and Special Training of the War Department. It was shown that for this work it was necessary to have new organization, new equipment, new subject matter or more intensive treatment of the old, and that there was a new type of student and a new teaching force. Among the conclusions drawn from the experience of the army training schools are the following: 1. That the time required for teaching most trades is very much less than is generally supposed when carefully organized, systematic, and intensive training is given. 2. That the necessary cost is far below estimates that have been made for such training in the past. 3. That best results can be obtained by concentrated effort day after day instead of a few hours each day or on alternate days. It was pointed out that the division of labor in many trades made it possible to prepare for this comparatively narrow line in a remarkably short time where the problem may be definitely stated. It was advised that the technical high schools establish courses from four to six months long and six to eight hours per day.

On Saturday morning, Mr. Griffith spoke on the training of shop men as teachers of shop work in vocational schools. Mr. Griffith explained the character of work being developed in Chicago and showed the methods being followed to interest the men in teacher-training courses. He advised that courses be given for the shop men of one trade, at a time wherever sufficient demand would so warrant.

Mr. G. F. Buxton of Indiana University, speaking on "How Mechanics Are to Be Inducted Into the Work of Teaching," reported the program of trade and industrial teacher-training being carried out in different parts of Indiana under the direction of the State University. He explained the general scheme as that of carrying the preparation for teaching to the tradesmen in their own towns in connection with local evening schools but furnished under the supervision of Indiana University, professional courses being taught by representatives from the University who make weekly trips to these localities, and courses in related subject matter being taught by teachers from the local schools. In this way the state requirement of 240 hours of instruction is gained in two years, two evenings per week, two hours per evening. An explanation was made of the work being done in Indianapolis, Evansville, Anderson, and Richmond, where 136 men are being reached in industrial teacher-training classes.

A summary of the deliberations of the three days' conference was given by Mr. C. A. Bennett of Bradley Institute.

NOW, ARE THERE ANY QUESTIONS?

SOURCES OF LUMBER SUPPLY.

The Industrial-Arts Magazine is frequently in receipt of requests for sources of cabinet woods and hardwoods which are not commonly carried in stock by lumber dealers. Such inquiries cannot be answered easily because it is impossible to maintain in a central point a list of lumber dealers so classified as to show what stocks these firms carry from month to month.

As a means of assisting subscribers who may desire special woods for cabinet making or other purposes, the list of lumber associations is printed below. Practically all the associations employ paid secretaries who are familiar with the manufacturers and dealers in lumber in their respective states and who, at the same time, know something of the shipping facilities and the accessibility of the towns and cities in their states. It is suggested that subscribers write to the association nearest their home for information concerning lumber stocks.

Arkansas Association of Lumber Dealers, (J. Burton Webster, Secy.) Little Rock, Ark.

Arkansas Lumbermen's Club, (R. R. McIntyre, Secy.) Pine Bluff, Ark.

San Joaquin Valley Lumbermen's Club, (J. C. Berger, Secy.) Fresno, Cal.

Southern California Retail Lumber Dealers' Association, (E. R. Shepherd, Secy.) Los Angeles, Cal.

Central California Lumbermen's Club, (C. G. Bird, Secy.) Stockton, Cal.

Denver Knot Hole Club, (O. O. Russell, Secy.) Denver, Colo.

Mountain States Lumbermen's Assn., (R. D. Mundell, Secy.) Denver, Colo.

Lumbermen's Association of Chicago, (E. E. Hooper, Secy.) Chicago, Ill.

National Lumber Manufacturers' Assn., (John Lind, Acting Secy.) 11 S. La Salle St., Chicago, Ill.

Southern Illinois Retail Lumber Dealers' Association, (S. W. Barrick, Secy.) Benton, Ill.

Northern Illinois Lumbermen's Club, (G. W. Kitchener, Secy.) Freeport, Ill.

La Salle County Lumbermen's Club, (F. B. Elliott, Secy.) La Salle, Ill.

Lumbermen's Club of Peoria, (Clarence E. Smith, Secy.) Peoria, Ill.

Evansville Lumbermen's Club, (Mertice E. Taylor, Secy.) Evansville, Ind.

Central Association of Lumber, S. & D. Salesmen, (T. H. Nelson, Secy.) Indianapolis, Ind.

Indiana Hardwood Lumbermen's Assn., (Edgar Richardson, Secy.) Indianapolis, Ind.

National Association of Lumber and S. & D. Salesmen, (T. H. Nelson, Secy.) Indianapolis, Ind.

Northern Indiana and Southern Michigan Retail Lumber Dealers' Association, (Irvin M. Jackson, Secy.) South Bend, Ind.

Northwestern Iowa Retail Lumbermen's Assn., (F. I. Gardner, Secy.) Cherokee, Ia.

Eastern Iowa Lumbermen's Assn., (F. J. Ward, Secy.) Clinton, Ia.

Des Moines Lumbermen's Club, (M. J. Miles, Secy.) Des Moines, Ia.

Northeastern Iowa Retail Lumber Dealer's Assn., (Geo. W. McGee, Secy.) Farley, Ia.

Southwestern Iowa Retail Lumber Dealers' Assn., (T. H. Potter, Secy.) Harlan, Ia.

Southeastern Kansas Retail Lumbermen's Assn., (Fred H. Rhodes, Secy.) Humboldt, Kans.

Louisville Hardwood Club, (R. R. May, Secy.) Louisville, Ky.

Lumbermen's Association of New Orleans, (Chas. F. Fettis, Secy.) New Orleans, La.

Lumbermen's Exchange of Baltimore, (L. H. Gwaltney, Secy.) Baltimore, Md.

Lumber Trade Club of Boston, (J. L. Barney, Secy.) Pope Lumber Company, Boston, Mass.

Massachusetts Retail Lumber Dealer's Association, (E. C. Hammond, Secy.) Boston, Mass.

Detroit Hardwood Club, (O. F. McClure, Secy.) Detroit, Mich.

Lumber Board of Trade of Detroit, (Chas. F. McClure, Secy.) Detroit, Mich.

Grand Rapids Lumbermen's Association, (William Noorthoek, Secy.) Grand Rapids, Mich.

Minnesota V. Association of Lumber and S. & D. Salesmen, (J. F. Hayden, Secy.) Minneapolis, Minn.

Northwestern Hardwood Lumbermen's Association, (J. F. Hayden, Secy.) Minneapolis, Minn.

Mississippi Lumbermen's Association, (Stanton Brown, Secy.) Meridian, Miss.

Southeastern Missouri Lumbermen's Association, (W. W. Watkins, Secy.) Cape Girardeau, Mo.

Southwestern Association of Lumber Salesmen, (J. L. Burd, Secy.) Kansas City, Mo.

Northeastern Missouri Lumbermen's Association, (W. F. Wigginton, Secy.) Moberly, Mo.

Montana Retail Lumbermen's Association, (Harry M. Yaw, Secy.) Great Falls, Mont.

New Jersey Lumbermen's Association, (James M. Reilly, Secy.) Newark, N. J.

Buffalo Lumber Dealers' Association, (K. C. Evarts, Secy.) Buffalo, N. Y.

Buffalo Lumber Exchange, (John S. Tyler, Secy.) Buffalo, N. Y.

New York Lumber Trade Association, (Sidney J. Treat, Secy.) New York, N. Y.

New York Lumber Trade Club, (E. F. Perry, Secy.) New York, N. Y.

National Wholesale Lumber Dealers' Association, (E. F. Perry, Secy.) 66 Broadway, New York, N. Y.

Retail Lumber Dealers' Association, (Paul S. Collier, Secy.) State of New York, Oneonta, N. Y.

Lumbermen's Club of Cincinnati, (O. P. Stratmeyer, Secy.) Cincinnati, Ohio.

Cincinnati Lumber Exchange, (Dwight Hinckley, Secy.) Cincinnati, Ohio.

Cleveland Board of Lumber Dealers, (J. V. O'Brien, Secy.) Cleveland, Ohio.

Lumbermen's Association of Columbus, (R. M. Lucas, Secy.) Columbus, Ohio.

Toledo Lumbermen's Club, (Chas. Sieving, Secy.) Toledo, Ohio.

Ohio Association of Retail Lumber Dealers, (Findley M. Torrence, Secy.) Xenia, Ohio.

Lumbermen's Exchange of Philadelphia, (John H. Lank, Secy.) Philadelphia, Pa.

Pennsylvania Lumbermen's Association, (J. Frederick Martin, Secy.) Philadelphia, Pa.

Philadelphia Wholesale Lumber Dealers' Association, (Robert B. Rayner, Secy.) Philadelphia, Pa.

Retail Lumber Dealers' Association of Philadelphia, (Chas. P. Maule, Secy.) Philadelphia, Pa.

Pittsburgh Wholesale Lumber Dealers' Association, John C. Criste, Secy., Pittsburgh, Pa.

Retail Lumber Dealers' Association of Pa., (W. G. Rebbeck, Secy.) Pittsburgh, Pa.

New England Yellow Pine Dealers' Association, (James A. Potter, Secy.) Box 783, Providence, R. I.

Nashville Lumbermen's Club, (S. Cecil Ewing, Secy.) Nashville, Tenn.

Lumbermen's Club, (W. G. Steinhagen, Secy.) Beaumont, Texas.

Lumbermen's Club of Houston, (Earl Dionne, Secy.) Houston, Texas.

Associated Lumber Salesmen of Texas, (F. D. Wherritt, Secy.) Waco, Texas.

Utah Retail Lumbermen's Association, (L. J. Taylor, Secy.) Ogden, Utah.

Salt Lake Lumbermen's Club, (H. M. Rhodes, Secy.) Salt Lake City, Utah.

Metropolitan Lumbermen's Club, (Herbert E. Smith, Secy.) Seattle, Wash.

Northwestern Lumber and S. & D. Trav. Salesmen's Association, (Robert R. Blackburn, Secy.) Milwaukee, Wis.